PROJECT PROFILE

2A105: Short range radio (SR2)

HIGH SPEED COMMUNICATIONS NETWORKS

Partners:

ADD
AICIA
CEIT
CISC
Fagor
IKERLAN
IMSE-CNM
IUMA-ULPGC
NXP
ST-Ericsson

Project leader:

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Key project dates:

Start: January 2008
End: December 2011

Countries involved:

Austria
Belgium
Spain

While a host of promising short-range radio technologies are becoming available, effort is now required to improve their coexistence, reduce their cost, integrate them efficiently and cut power consumption. The SR2 project focuses on novel and ultra low power components for wireless personal area and body area networks which will play an important role in future home automation and personal healthcare. Its ultimate goals are to develop multi-standard system-on-chip devices, assess their co-existence performance and integrate them with selected applications. The MEDEA+ project aims to underpin continuing European leadership in Bluetooth, ultra-wideband and IEEE 802.15 wireless communications.

Personal area networks (PANs) and wireless body area networks (WBANs) are expected to play a major role in the smart environments of the future. Such networks will be used in a wide variety of applications ranging from multimedia and video connectivity to home automation and health monitoring as well as to wireless sensor networks in general.

The variety of applications results in different, sometimes contradictory requirements in terms of power consumption, data rates, node densities and network configurations. A single standard cannot address all of these requirements. Consequently, several standards and physical layers such as Bluetooth, Zigbee, Wimedia, Bluetooth ULP (Ultra Low Power – formerly Wibree), IEEE 802.15.4, IEEE 802.15.3 and IEEE 802.BAN have been or are being developed.

As these various standards often cover the specific needs of particular PAN applications, several standards will have to co-exist without impairing each other in the near future. The devices or user terminals will have to be compatible with those standards to aggregate the data for presentation to users in a unified framework. The most popular current example is Bluetooth – which incorporates several types of physical layer (PHY) in a unified framework – or the IEEE 802.15.4 framework with additional narrowband PHYs.

Multi-standard building blocks

The MEDEA+ 2A105 SR2 project set out to develop multi-standard or multi-physical layer building blocks, system on chip (SoC) and system-in-package (SIP) devices and platforms for future terminals, which will have to handle this variety of physical layers and protocols within reasonable boundaries and ensure their market success.

SR2 will investigate and implement ultra low-power solutions and contribute to emerging standards in the ultra low power WPAN and WBAN domains – especially the forthcoming IEEE BAN standard. It will also develop multi-mode chips – such as Bluetooth/Bluetooth ULP chips able to operate the different physical layers – and reconfigurable chips able to operate different physical layers foreseen in the IEEE 802.15 family of standards.

One specific topic is the development of different aerial topologies. New aerial designs are needed to be used near the

human body in PANs and a second type is required to perform through-the-wall communications using ultra wide band (UWB) techniques. It will be necessary to assess the interoperability and co-existence of the resulting solutions by developing and evaluating a selection of prototypes in multi-standard test beds and to integrate and validate the new chips and aerials in specific devices for home monitoring applications.

The development of systems and building blocks for new wireless access systems is at the heart of the proposed activities, with breakthroughs expected in multi-mode operations and ultra low power operations.

Supporting European efforts

SR2 supports European efforts to meet system requirements for higher operation frequencies, lower power dissipation and increased reliability in consumer electronics wireless devices and healthcare applications. As different wireless technologies will be recommended for the envisioned application domains, a broad panel of research and development (R&D) competences is required.

The consortium brings together specialists in silicon technology, aerials, radio frequency (RF), baseband, protocol stack and application engineering. Transnational co-operation will be essential to achieve significant results in crucial targets such as co-existence measurements and interoperability. The project will also contribute to the definition of standards based on reusable silicon solutions and selection of the appropriate blend of technologies and specific solutions in the application domains selected.

In terms of knowledge sharing, the project has been set up to include a mix of chipmakers, telecommunications and home automation systems manufacturers, small and medium-sized enterprises (SMEs) and highly skilled research organisations that will stimulate the generation of numerous intellectual property (IP). It will also satisfy long-term ambitions in the delivery of seamless broadband services for home-based and mobile users in various applications – multimedia, patient monitoring, etc. – with adequate quality of service, security and safety. Finally, it will provide improved R&D co-operation between academic/research institutions and industry.

Meeting market needs

Over the last five years, short-range radio communications for personal area, healthcare and multimedia applications have experienced a rapid emergence of new technologies. Bluetooth® was introduced in 1994 and its specifications were upgraded in 2003 and 2004. Nevertheless, a further breakthrough in terms of increased bit rate and reduced power consumption are still required.

In 2002, the US Federal Communications Commission (FCC) revised the use of the spectrum in the 3.1 to 10.6 GHz band. As a result, UWB technology gained considerable attention and industrial momentum. Today, multi-band orthogonal frequency division multiplexing (MB-OFDM) technology, standardised as ECMA-368 in December 2005 and supported by the WiMedia Alliance, aims to deliver data rates between 110 and 480 Mb/s at a few metres range.

The short range wireless portfolio is full of new and promising technologies but further efforts are needed to improve co-existence, reduce cost, combine them efficiently and reduce overall power consumption. The proposed innovation lies in the design of ultra low power building blocks and physical layer CMOS chips which are compliant with one or several standards. Indeed, multi-mode radio for short range communication offers a real solution for combined services support and improved co-existence at low cost and low power.

Increasing European influence

This MEDEA+ project addresses several areas of innovation such as the design of critical subsystems and building blocks for ultra-low power, short-range emerging wireless technologies; the implementation of those functions in state-of-the-art SoC solutions; and the assessment of co-existence and interoperability of the different standards by means of demonstrators.

By joining forces in SR2, key players in this field of the European industry can increase their influence and effectiveness in global standardisation. The results of the project will help leverage the effect of European companies in WPAN and WBAN standardisation forums.

The increase of know-how and expertise will not only create opportunities for increased market shares and a stronger European position in portable equipment, but will also create badly needed employment opportunities, ranging from product design and engineering to manufacturing and distribution in the WPAN/WBAN market.

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