



A109: Wireless technologies for small area networks with embedded security and safety (WITNESS)

HIGH SPEED COMMUNICATIONS SYSTEMS

Partners:

Advanced Digital Design
 AICIA
 AnSem
 ARC
 CEIT
 CETECOM
 CISC
 Cissoid
 CNM-IMSE
 Polytechnique Mons
 Fagor Electronica
 Ikerlan
 IMEC
 IUMA
 Philips
 STMicroelectronics
 Televes
 Uni Louvain (UCL)
 Uni Vienna (Med., ISTU)

Project leader:

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Key project dates:

Start: 1 November 2003
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Countries involved:

Austria
 Belgium
 Spain

Wireless personal and body area networks are set to play an increasing role in applications such as health, personal safety, secure wireless data exchange or home entertainment. The WITNESS project is developing new technologies for such short-range communications using very low power while developing extensions to new and existing standards. It is also focusing on data secrecy and data safety – preventing attacks, corruption and/or loss of service – inherent in wireless communications. The aim is to reinforce Europe's lead in short-range transmission, increase market share in portable electronic equipment and boost employment from product design and engineering to manufacturing and distribution.

Wireless connectivity has already enabled computer users to profit from a new convenient mobile lifestyle. Consumers are now demanding the same simplicity throughout their homes, connecting personal computers (PCs), personal digital recorders, MP3 recorders and players, digital camcorders and digital cameras, high-definition TVs, set-top boxes, game systems, personal digital assistants and mobile phones to each other in versatile domestic wireless personal area (WPAN) and body area (WBAN) networks. However, current wireless local area network (WLAN) and WPAN technologies cannot yet meet the needs of tomorrow's connectivity for the host of emerging consumer electronic devices that offer full mobility while requiring low power, quality of service (QoS) and security. So, as computing, communications and consumer applications converge to provide domestic consumers with extensive new services in an intelligent ambient environment, there is an urgent need to develop short-range user-centred wireless networks.

No single solution

It is unlikely that any single wireless technology will meet the requirements of all

possible such applications in terms of security, range, bandwidth and QoS. Multiple technologies will have to coexist, often sharing the same bandwidth. The MEDEA+ A109 WITNESS project set out to identify the tradeoffs between security/safety enhancements, QoS, cost and power consumption inherent in such networks. It will open the door to a wide range of new applications and services that require high levels of data security and protection.

The overall objective of WITNESS is to ensure that the European semiconductor and consumer electronics industry maintains leadership in existing and emerging markets for short-range wireless networks. This involves developing the critical building blocks to offer an open platform for designing low power and low cost integrated components with embedded security features.

Key goals

Key goals include:

- Identifying security, safety and QoS issues in small area networks and analysing their impact on cost and power requirements;
- Studying interactions of several wireless systems operating simultaneously and

proposing architectures to minimise impact of resulting interference on hardware implementations;

- Testing and validating solutions on demonstration platforms in the same vicinity;
- Specifying, designing and testing integrated system-on-chip (SoC) solutions using leading-edge silicon technology able to satisfy a wide range of applications;
- Providing designers with solutions for optimisation of WBAN and WPAN devices with a strong focus on home entertainment and medical/user environmental control applications; and
- Improving existing and/or defining new and emerging standards with satisfactory proposals for security and safety enhancements.

The consortium brings together chip-makers, system designers, mobile equipment manufacturers and research organisations to concentrate on specific domains and technologies considered as most relevant to the development of wireless devices for short- and medium-range communications.

Soon after the start of the project, it became clear some partners could not continue. A new consortium was formed at the end of 2004 with new targets and goals while maintaining a continuation of the executed part of the original plan.

Partners will investigate Bluetooth, magnetic induction, ultra-wide band and IEEE 802.15.4-based Zigbee wireless networking technologies, and recommend specific scenarios. Active participation in global standardisation bodies is being handled

by partners already involved in or accustomed to such activities.

Medium and low data rates

Two main application domains have been selected: medium data rate transmissions in personal communications for business and entertainment applications; and low data rate transmissions in medical and/or fitness applications – including telemedicine – at home and in hospitals.

The personal communication/entertainment platform is configured to distribute speech or other audio signals to and from an individual. It is characterised by a medium data rate – up to 2 MB/s – and some real time, low latency performance issues. Magnetic induction (MI) is used for the wireless data transfer at very short distances in the BAN, with wireless USB based on ultra wide band (UWB) technology for the PAN. In between, there is a wireless USB-to-MI bridge. The aim is to demonstrate WITNESS technologies can at least support basic voice communications.

The personal health/fitness monitoring platform consists of sensor applications connected through a BAN to transmit body and environmental parameters to the fixed world. The platform is characterised by a moderate data rate and extremely low power consumption together with high reliability. A demonstrator will focus on medical and/or wellness applications.

Radio frequency (RF) and/or MI will be used in the BAN, while Bluetooth will be used for connection to the fixed world. A Bluetooth/Zigbee to RF/MI gateway will be used to connect the BAN and the PAN.

The aim is to demonstrate that at least medical sensor data can be collected wirelessly and then transferred to a PC for display of information such as the pulse rate or blood pressure of the person involved. In addition, the platform configuration may feature some interactivity, such as user environmental control. This would offer the opportunity to test the coexistence of another radio system with the main selected technologies in the demonstrator.

Key enablers for Europe

WPAN and WBAN applications are important features in future electronic market development and will be strong drivers for SoC and system-in-package (SIP) progress. Development of key wireless-related blocks, linked to application software, is a major enabler for advances in European industrial activity in WPAN and WBAN standards. The demonstration of the feasibility of a short-range communication standard will orient the selection and prepare the future WBAN/WPAN landscape.

The overall result of WITNESS will be to reinforce Europe's lead in short-range transmission technologies, increase market share in portable electronics equipment and boost European employment from product design and engineering to manufacturing and distribution. Stimulation of pan-European collaboration will ensure proposals for common solutions, thus strengthening the position of the participating companies towards global standardisation. It will also bring direct advantages in terms of lead time to European players in these markets.



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