

# A105: Universal wireless local area network (UniLAN)

## HIGH SPEED COMMUNICATION SYSTEMS

### Partners:

AixCom  
Alcatel  
CEA-LETI  
Ericsson  
Fractus  
France Telecom R&D  
Fraunhofer Institute  
IMEC  
IMST  
Infineon Technologies  
LEA-Kurtosis  
Nokia Research Centre  
RWTH Aachen  
STMicroelectronics  
Thales Communications  
Universitat Politecnica de Catalunya

### Project leader:

Edgard Laes,  
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### Key project dates:

Start: January 2001  
End: December 2003

### Countries involved:

Belgium  
France  
Germany  
Italy  
Spain  
Sweden

European companies have had difficulties breaking into the existing highly-developed market for local area network (LAN) applications, as the world industry is currently dominated by competitors in the USA and the Far East. However the embryonic market for broadband wireless applications offers a major opening for the European microelectronics industry. With a range of technologies under development and standards still being defined, an opportunity exists for companies to build an important presence in this promising new market sector. The MEDEA+ UniLAN project aims to supply the technology needed to help European firms establish just such a foothold and build new business in a global market.

The USA has long dominated the market for LAN applications, with little hope for European industry of catching up in a rapidly developing industry sector. However LAN standards are changing. With wireless technologies advancing fast and standards such as HIPERLAN/2 and HiperAccess offering higher data rates, future LAN applications are likely to be wireless based.

Wireless local area network (WLAN) technology is becoming increasingly attractive because of the support it offers for mobile services, portable terminal interconnectivity and anytime, anywhere connections. And with the cost of related short-range wireless standards such as Bluetooth coming down fast, wireless systems are likely to replace current wired communications.

### Common mobile terminal

The MEDEA+ A105 UniLAN project therefore aims to develop and demonstrate the building blocks necessary for a common wireless terminal compatible with WLAN standards. The proposed terminal will be a broadband, mobile wireless networking platform capable of interworking with

HIPERLAN/2 and Bluetooth as well as subsequent developments of those standards. Looking even further forward, some partners are researching the promising Ultra Wide Band (UWB) technology. This new wireless communication technique can potentially support data rates above 100 Mb/s and offers accurate positioning capabilities.

Project partners include semiconductor designers, system developers, antenna experts and research institutes from across Europe. Each organisation brings its own specialist expertise to the project, which is co-ordinated by Alcatel Microelectronics in Belgium.

UniLAN builds on results of work carried out in earlier European Commission Fifth Framework Programme, MEDEA and national projects. UniLAN is also co-operating with the participants in the MEDEA+ A103 UniAccess project to define, develop and test the complete system. The WLAN building blocks for future multi-standard terminals being developed in UniLAN could also be used in UniAccess, where the focus is on developing components for physical transmission, switching and routing.

### Overcoming technical challenges

The UniLAN project is looking initially at system architectures to achieve high data rates with good quality of service and high security. It will then concentrate on developing the building blocks required, including base-band digital signal processing (DSP) and media access controller (MAC) chips as well as the even more challenging radio frequency (RF) modules – an area where Europe holds a lead. Work is also required on improving antennae to handle the multiple reflections found in homes and offices. Multiple antenna techniques are being investigated for their great potential in data-rate enhancements and/or interference mitigation. Project partners have to overcome a number of challenges. They need to pick the best DSP techniques for use in such a terminal, develop and test a range of devices for the terminal architecture and improve the efficiency of power amplifiers for mobile terminals. They have also committed to specifying a reconfigurable hardware/software approach to help minimise the architecture development costs. UniLAN will ultimately develop a demonstration platform for the terminal for use at a test site, to check interoperability and provide real-life feedback for the devices developed. The constraints of the MAC layers in the Bluetooth and HIPERLAN WLAN standards will also be taken into account to ensure full interoperability.

### Widespread wireless access

Wireless LAN applications are likely to be central to the future communications needs of both corporate and small office

home office (SOHO) users. In the office, wireless communications provide better support for the highly mobile day-to-day tasks of the modern corporate worker. Terminals developed under UniLAN will be usable in both PC and mobile terminal environments.

However it is the market for wireless office LAN applications among the big corporations that is the most interesting – this sector is expected to represent more than 50% of the total market by 2005. Wireless access points can be installed in airport terminals, conference centres, hotels, coffee shops and other public locations as well as in the user's office location.

With such widespread access, users can read and send emails, surf the Internet and carry out a wide range of other LAN-enabled office applications from their laptop PC, wherever they are. For example, more than 4,000 US coffee shops could be equipped with such wireless access points by the end of 2002.

UniLAN also has the potential to reinforce European leadership in cellular telecommunications. This will directly assist in the development of third and fourth generation GSM mobile phone applications by combining the technological know-how of the project partners. Demand for semiconductor devices for the wireless market is expected to mushroom: the 2005 semiconductor chip market is expected to surpass € 1 billion for high speed WLAN and even € 5 billion for Bluetooth chips.

At the same time, one project partner plans to use the resulting technology in an interesting application in the commercial aeronautics sector. Broadband wireless LAN technology is likely to be a significant asset in applications such as Gatelink,

which allow aircraft to exchange data with air terminal computing systems while taxiing on airport runways.

### Exploiting IP rights and expertise in Europe

From the marketing point of view, a key outcome of UniLAN will be the development of intellectual property (IP) rights in the project results, together with the accompanying expertise in hardware/software development and telecommunications. These IP rights will be transferred to integrated circuit (IC) designers and chip manufacturers co-operating in UniLAN, thus keeping them within the European microelectronics industry and enabling these companies to design the devices needed for the new multi-standard terminals.

Moreover, UniLAN will help boost the research and business links between industry and academia. With major industry names in the microelectronics sector across Europe participating as well as academic institutes in Belgium, France, Germany and Spain, UniLAN will both help PhD students benefit from the latest research activities and create a growth path into industry for skilled microelectronics engineers.

The consortium also intends to take an active role in disseminating the results of UniLAN at key international symposia and in the relevant industry journals. Presentations on the results of the project will be given at relevant conferences. And several partners are members of standards groups such as the ETSI Broadband Radio Access Networks (BRAN) project – responsible for HIPERLAN/2 – and the Bluetooth Special Interest Group, where they would encourage two-way communication.



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