

High speed
communications
systems



AI05: Universal wireless local area network (UniLAN)

Heating up communications hot spots

The MEDEA+ AI05 UniLAN project developed integrated circuit architectures and radio frequency (RF) components to implement existing and future European-backed standards for wireless data communications. As a result, equipment for 3G mobile phone networks and company or domestic wireless local area networks will become available to a wide range of users. This offers an immediate global advantage to European communications equipment manufacturers and, in the near future, to European consumer electronics suppliers – increasing worldwide markets and boosting employment opportunities in Europe.

Wireless networks are becoming more and more prevalent. Many public places, such as hotels, restaurants, airports and railway stations, now have wireless 'hot spots' where subscribers can use a wireless connection to access the Internet from their laptop or personal digital assistant (PDA). There is no doubt that the market for wireless networks is going to grow explosively. Even in the domestic market, households with several computers will find it very convenient to use a wireless network to link into shared printers and the Internet.

Nevertheless, there are major differences between competing standards. The IEEE 802.11 wireless local area network (WLAN) standard is in use worldwide, and revisions have been produced to make it comply with various technical and legal requirements. However, this standard does not adequately support 'Quality of Service', which is amongst others a function that enables certain types of traffic, for instance mobile phone conversations, to take priority over less important transactions, such as printing. Two European-backed wireless standards – HiperLan2 and Bluetooth – offer many advantages over IEEE 802.11. HiperLan2 supports Quality of Service and offers very high data transfer rates, making it suitable for in-home video transmission. Bluetooth is favoured for personal area networks (PANs),

where a long distance connection is not necessarily needed, but where ease of configuration is important.

Producing impressive results

The MEDEA+ AI05 UniLAN (universal LAN) project set out to provide building blocks offering wireless broadband communication in the home, office and public hot spots that replicate the success of GSM mobile telephony in the WLAN market. This involved creating innovative system architectures, critical baseband and radio frequency (RF) components and aerial architectures, as well as their integration into reference platforms. These platforms are based on standards with strong European backing, such as HiperLan2 and Bluetooth as well as emerging techniques such as ultra wide band (UWB), and the ubiquitous IEEE 802.11 family. Advanced techniques relying on multiple antenna transmission were also investigated. Partners included system companies, chipmakers and research institutes.

Results have been impressive, with system architecture definitions that include:

- Real-time WLAN modelling system architecture;
- Interworking architecture between UMTS (3G mobile) and WLAN that supports

hand-off – that is handing over automatically from one network to the other without having to reconnect; and

- Virtual private network (VPN) and voice-over-WLAN systems.

The consortium has also developed microwave hardware components, including a WLAN block in bipolar CMOS (BiCMOS) that operates at 5 GHz, and multi-standard printed aerials. Platforms have been developed for a variety of applications, including a demonstrator for WLAN security using an enhanced subscriber identification module (SIM) for VPN over 802.11, and test bench elements for the evaluation of UWB methods.

UniLAN partners have also studied on-chip integration of 10- to 20-GHz aerials using standard 0.25-micron BiCMOS processes. This would make it possible to produce RF components with integrated aerials that incorporate advanced functions such as diversity reception to improve the wireless connection quality.

Speeding time to market

These results mean that participants in the consortium have built up a useful portfolio of know-how. Intellectual property (IP) is very valuable in this area and enables companies to respond quickly to fast-changing requirements. Having this kind of resource available means that the companies involved can bring products to market quickly – an important consideration when striving to obtain market visibility. Although the communications market is the focus of UniLAN, the nature of the product, and the volumes anticipated, mean that eventually the products will be applied in the consumer electronics market. This observation is supported by the fact that

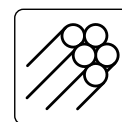
there is, currently, quite strong price erosion; communications products are performing as if they were consumer products. It is foreseen that this kind of technology will be taken up both in the domestic and commercial markets. Wireless network products, for example, incorporating UniLAN technology could be used within the home to watch the TV or videos from a PC or laptop.

The consortium's timescale for seeing the UniLAN concept move beyond the research phase is quite long on account of the breadth of the project. Standardisation is an important element of the work, as the rate of progress can be no faster than that of the standardisation bodies. It is likely that the first commercial implementations will start to appear over the next two to three years.

Boosting European employment

The UniLAN consortium came together quite naturally. In practical terms, joining the project gives members almost immediate access to new ideas and new technologies. Partners were aware that they are working with IP of very high value. They were bound by strict non-disclosure agreements that set the boundaries; within these boundaries, members collaborated in a very open manner.

There are important benefits in working within the MEDEA+ framework for Europe as a whole. Projects such as UniLAN tend to focus and concentrate expertise, which in turn extends the level of expertise. It also leads to increased employment in research and production establishments; this has the effect of boosting the economic strength and competitiveness of Europe relative to the USA and the Far East.



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Partners

Alcatel Business System
Alcatel Microelectronics (now STMicroelectronics)
CEA-LETI
FRACTUS
France Telecom R&D
GEMPLUS
IMEC
Infineon Technologies
LEA
Nokia
STMicroelectronics
Thales Communications
UPC

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Key project dates

Start: January 2001
End: December 2003

Countries involved

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France
Germany
Italy
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