



# AI04: System-on-chip solutions for advanced UMTS base stations (SCUBA)

### HIGH SPEED COMMUNICATION SYSTEMS

#### Partners:

Alcatel  
ATMEL  
CEA LETI  
Chipidea  
Italtel

#### Project leader:

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#### Key project dates:

Start: September 2001  
End: February 2004

#### Countries involved:

France  
Germany  
Italy  
Portugal

**Universal Mobile Telecommunication System (UMTS) based mobile communications are forecast by industry sources to be used to connect up to a billion customers within the next five years. The 'third generation' UMTS standard is designed to offer access to all types of information, multimedia and other data with high quality, wireless services for everyone. These services are expected to create a turnover of € 80 billion a year over the same period. The goal of the MEDEA+ SCUBA project is to boost the application of this new generation of mobile phones by developing innovative, easily and cheaply produced key functional elements for base stations, and their access to the worldwide communications network.**

Being mobile has become a key function for the current generation of managers, employees and freelance workers. Some of these no longer even have a permanent desktop, but work in their own 'virtual' environment. For such people, fast and cost-effective access to the information highway is essential to stay in contact with their business, customers and partners, wherever they may be located.

The UMTS-based wireless system should spawn a wide variety of communication services to satisfy such people's demands. Not surprisingly, major world telecommunications network manufacturers - Alcatel, Ericsson, Fujitsu, Lucent, Motorola, Nokia, Nortel and Siemens - have already announced they are developing equipment for UMTS. This builds on and extends the capabilities of today's mobile phone technologies by providing increased capacity, data capability and a far greater range of services using an innovative radio access scheme and advanced core network.

All these companies are making aggressive market share claims for themselves which, if they were all realised, would add up to a value well above 100%. There is clearly going to be tough worldwide com-

petition for this new third generation mobile phone business. The backing of European industry by research frameworks, such as MEDEA+, is therefore essential if companies are to develop and bring in time to the market technologically competitive and cost-effective equipment for network manufacturers and operators to meet the expected demand for their products and services.

### New market opportunities

The results of the MEDEA+ A104 SCUBA project will help the participating system manufacturers to supply the components required by the UMTS network operators, as well to exploit the expected market demand - 300,000 UMTS base stations to be installed in Europe over the next few years! And it cannot happen a moment too soon. So far, the main router manufacturers, such as Alcatel, Cisco, Lucent and Nortel, have not announced devices which conform to the specific requirements of the interconnection network between the base stations and the radio network controllers of the UMTS networks. However work on the specifications required by the UMTS

network manufacturers and operators is advancing quickly.

US network processor companies – such as Motorola/C-port, INTEL/Level One, IBM, Vitesse/Sitera and MMC – are rapidly becoming market leaders in this kind of interconnection devices, while European silicon companies are still lagging behind in this crucial area.

### Addressing fundamental need

SCUBA therefore addresses the fundamental requirement of mobile communication networks: making the use of the frequency spectrum as economic as possible. This resource is limited and new communication systems can usually only get spectrum allocated at the cost of other systems.

The first part of the project aims to develop processing components for the radio interface of a new generation of high-performance base station. These integrated devices will process a range of different carriers' signals more effectively and be able to work with new, more efficient power amplifiers.

Part two will add functionality to access multiplexer devices, which interconnect UMTS base stations with their radio network controllers. A new dedicated, but reconfigurable, co-processor architecture should relieve the access multiplexer from the burden of high throughput tasks. It will bridge the gap between the required bandwidth and the processing power offered by a traditional central processing unit (CPU).

A consortium of telecommunications manufacturers, research institutes and semiconductor manufacturers is carrying

out the project. Two systems houses – project co-ordinator Alcatel and Italtel – shoulder the major responsibility for the various aspects of system design and specification. They are working closely with ATMEL, responsible for semiconductor design and for the verification and validation of component functions. Other essential tasks are being taken over by subcontracted research institutes and by SME ChipIdea. Links are being established to MEDEA+ projects focusing on complementary aspects of the project – such as UniAccess, UniLan and 4G-Radio – creating as much mutual benefit as possible from European co-operation.

### Exploiting the expertise

Today the required perfection of analogue signal processing still cannot be reached in highly integrated components and the efficiency of power amplifier transistors will remain on a very poor level for the next few years.

Current network equipment development has mainly concentrated on pure data throughput, but new applications in access networks demand a level of quality that can no longer be provided by simply increasing the processing power and the bandwidth of conventional chip technology. New processing architectures are now needed to deal with a complex set of high-speed signal/data processing, and routing requirements.

Expertise gleaned from the MEDEA+ A104 project will greatly strengthen the market position of the participating system manufacturers Alcatel and Italtel by enabling them to offer future proof and standard-

ised components to their UMTS customers. In turn this will keep and create jobs.

Furthermore, the experience gained and intellectual property rights developed from the project will be reused in the development of other components which in turn will allow participating companies to bring new products to market much quicker than they would otherwise be able to do, and so strengthen Europe's position in the worldwide market. The development of new chip architectures will probably lead to these companies establishing patents – thus keeping and strengthening their market position even further.

Semiconductor manufacturer ATMEL intends to put components based on the results of the project on to the open market to enable other European companies, including SMEs, to benefit from the project results when designing their specific solutions. This should significantly improve the situation of the European telecommunication industry in this rapidly growing market.

The opportunity to take an active role in new pan-European research and development programmes will also enhance ChipIdea's capability to become a strong contender in the world semiconductor market as a supplier of competitive solutions across many application segments, including communications, multimedia, industrial and consumer electronics.

Finally, the knowledge gained in the project through the interaction among the several partners will help to contribute to evolving standards and to steer the research in European countries in a direction that is relevant for the industrial needs of tomorrow.



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