



# A203: Integrated modem for digital terrestrial TV (IM4DTTV)

### INTEGRATED INFORMATION/ COMMUNICATION/ENTERTAINMENT (ICE) TERMINALS

#### Partners:

CEA LETI  
Fracarro Radioindustrie  
France Telecom R&D (TDF)  
Giunti Interactive Labs  
ITIS  
Philips Digital Networks  
RAI-CRIT  
RTE  
Runcom  
Scuola Universitaria Professionale della Svizzera Italiana  
STMicroelectronics  
TChip Semiconductor  
Thales Broadcast and Multimedia  
Uni.com

#### Project leader:

Fabio Scalise,  
STMicroelectronics

#### Key project dates:

Start: May 2001  
End: April 2004

#### Countries involved:

France  
Ireland  
Israel  
Italy  
Switzerland

The transition from analogue to digital broadcasting is currently the major topic in the TV industry; new standards have appeared for satellite, terrestrial and cable broadcasting and are being implemented in Europe and worldwide. The IM4DTTV project aims to specify, design and test a system-on-silicon solution for an integrated wireless terrestrial modem for interactive digital terrestrial TV based on the new European DVB-RCT standard. The MEDEA+ consortium will provide a first generation silicon solution and a complete hardware validation platform covering all aspects of the DVB-RCT-based interactive system, including both the user terminal side and the base station for the broadcasting side.

Digital TV seems only attractive if interactive. This is true in general for terrestrial TV, where users do not want to spend more money simply for a digital TV broadcasting service. New specifications generated by the industry-led Digital Video Broadcasting (DVB) organisation cover an interactive return channel via cable and satellite and, most recently, a terrestrial one (DVB-RCT). DVB-RCT is a low cost wireless technology that will be able to penetrate markets that are currently poor in cable infrastructures. It will be able to compete with cable due to its very low cost, both for the terminal user and the network operator. It is expected that this project will ensure a leading position for the European TV industry in the key area of interactive systems deployment. The MEDEA+ A203 IM4DTTV project is reviewing the current DVB-RCT specification and developing a prototype very large-scale integration (VLSI) solution as the basis of the standard. It will support all investigation and tests needed to define the DVB-RCT specification as part of the final European Telecommunications Standards Institute (ETSI) standard. This will be achieved by building a hardware evaluation platform around the silicon

solution to test the system performance in realistic conditions.

Consortium members include leading world chipmaker STMicroelectronics, key TV set and multimedia players Philips and Uni.com, and head-end equipment manufacturers Thales Broadcast and Multimedia, Runcom and ITIS France to represent the European TV industry. The consortium is completed by European broadcasters RAI-CRIT and RTE as well as other research centres and universities (e.g. CEA-LETI and France Telecom R&D) and a developer of professional interactive software applications (Giunti Ilabs).

### Asymmetric interactive system

DVB-RCT is not only a physical layer for interactive digital terrestrial TV but also constitutes the foundation of an asymmetric interactive system by use of the wireless terrestrial modem. Performance will depend largely on the quality of the management performed by the software layers and executed by the media access controller (MAC) part of the chip being designed for the project. For a successful system launch, it is essential to be able to

test extensively the various situations the chip may encounter.

The main objectives are to:

- Add seamless interactive capabilities to the booming digital terrestrial TV system based on the DVB-T standard, providing fast access from the TV set to the Internet, interactive TV applications, e-commerce, e-learning, and to implement the new DVB-RCT standard for the first time;
- Design and manufacture low-cost integrated interactive terminals for digital terrestrial TV based on DVB-RCT technology using a dedicated silicon solution – both base band and radio frequency (RF) parts – designed and developed within the project itself. The initial phase will deal with a first generation silicon multi-chip solution (with the aim of testing critical parts of the DVB-RCT specification), while a second generation one will deal with a system-on-silicon solution for a terrestrial modem, once the DVB-RCT standard is finalised, based on the most advanced CMOS process available (130nm);
- Test and validate the integrated interactive prototype terminal for digital terrestrial TV, based on the silicon solution developed within the project;
- Verify and validate the field operation of the DVB-RCT system by implementing challenging and attractive interactive applications and performing preliminary laboratory tests on the silicon solution; and
- Support the rollout and standardisation processes for a DVB-RCT Return Channel for digital terrestrial TV and the imple-

mentation of digital TV (broadcasting and interactive).

### Meeting strategic needs

This MEDEA+ project supports European effort in wireless interactive TV deployment, focusing on challenging and booming applications such as e-commerce, e-learning, Internet, realtime tele-voting, home banking and interactive advertising. Availability of an efficient, low cost silicon solution will be the determining factor for the deployment of such services to a large variety of users in Europe and worldwide. The project also aims to provide a low-cost wireless solution as enabling technology, as well as to support a DVB standard in Europe and around the world.

Historically, TV has been a one-way flow of information and entertainment from the broadcaster to the viewers. It has become the dominant mass medium in most countries and played a major role in shaping society and in reflecting society back on itself. Analogue terrestrial TV has been mandated in most developed countries to provide a low cost universal service to ensure equity between urban and rural groups in society.

In many European countries, including France, Great Britain, Italy and Spain, terrestrial VHF/UHF is still the dominant delivery system. In most industrial countries, more than 98% of households have at least one TV set. Increasingly, governments realise that, at most, only 65 to 70% of households will own and operate a personal computer. For the remainder, PCs are seen as too complex to operate or irrelevant.

It is predicted that interactive digital terrestrial TV will provide all households –

including those with an aversion to PCs – with a user friendly and inexpensive route to participation in the Information Society. Interactive digital TV has the potential to become one of the first home e-commerce systems. The prevalence of digital TV in homes throughout Europe offers the exciting prospect that all parts of society will be able to participate in the e-commerce revolution. However, much investment will have to be put into service creation.

Clearly, interactive digital terrestrial TV requires a return path on top of the digital terrestrial TV standard from the set back to the broadcaster or information system provider. Existing traditional return paths via fixed, wireless or mobile phones are not optimised and are often inherently unsuitable for applications of interactive digital terrestrial TV.

Worldwide acceptance of the DVB-T broadcasting standard will act as a driver for the acceptance of the DVB-RCT solution, because of the compatibility between DVB-T and DVB-RCT.

DVB-RCT also combines several technical elements (OFDMA, Adaptive Modulation, CDMA, Advanced Channel Coding, etc.) that are today considered the basis of future broadband transmission systems – both fixed and mobile. Therefore, the strategic impact of the work carried out within the IM4DTTV project goes beyond interactive terrestrial TV and can be considered a promising basis for the development of future high performances 4G wireless systems for both broadband wireless access (BWA) and advanced mobile systems beyond 3G UMTS.



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