A202: Future storage (FUST)

INTEGRATED INFORMATION/ COMMUNICATION/ENTERTAINMENT (ICE) TERMINALS

Partners:

CiaoLAB Technologies
OnStream Data
Philips
STMicroelectronics
Thomson multimedia

Project leader:

Jef Pijnenburg,
Philips Electronics

Key project dates:

Start: January 2001
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Countries involved:

France
Italy
The Netherlands

New systems for mass data storage will be required to cope with increasing demands arising from the continuing growth in communications, the convergence of PC and consumer electronic products, the quest for static and portable digital video capability, and the emergence of home servers (residential gateways). MEDEA+ project FUST will include research and design activities into the definition of consumer and professional systems, using both optical and magnetic storage media. As well as devising common system architectures, it will develop prototypes of key components and create tools for testing and validation. It will also contribute to the standardisation debate to resolve current format conflicts.

The aim of the MEDEA+ A202 FUST project is to strengthen Europe's ability to deliver system-on-chip (SoC) devices for future mass storage systems. It focuses on general architectures, prototype integrated circuits (ICs) and systems, and the development of intellectual property that will form the basis for advanced products to meet developing demand.

Know-how acquired as a result of this initiative will stimulate further growth in the semiconductor and computer industries – as well as offering the potential to build market share in sectors such as consumer and professional electronics. Furthermore, it could lead to the emergence of completely new product areas.

Increasing need for data storage

Both in business and at home, the rising importance of the personal computer (PC) and the exponential growth in communications – especially mobile devices – are creating a continuously increasing need for data storage.

Various technological options are currently competing for acceptance. In the PC world, CD-ROM drive sales are experiencing a slow decline as CD-RW (rewritable) and DVD-ROM units take their place. These, in turn, will start to lose share in favour of combination drives, which will move into the market from late 2003. Combo drives (i.e. combinations of CD-RW and DVD-ROM) and the still unresolved 'war' on the rewritable-DVD format will keep rewritable DVD shipments low in the near future.

There is little doubt that 'super-combo' drives (CD-RW and DVD-RW/DVD+RW) will dominate the market as soon as a common format is agreed upon. Such an agreement will undoubtedly also lead to a high level of silicon integration. However, recent improvements in the inexpensive linear magnetic tape (LMT) make this a strong contender for applications that require high quality in combination with high storage capacity and a fast transfer rate.

In the high-volume consumer electronics market, the popular analogue video cassette recorder (VCR) will soon be replaced by products based on digital technology. This, too, will create massive opportunities for new storage systems.

The long-term winner for home recording will probably be the removable optical disk. In the meantime, however, there is already

significant activity around hard disk drive (HDD) based time-shift functionality (personalised TV) – first products were launched at the end of 1999. Time-shift recording complements the consortium's strategy by introducing new features provided by digital systems.

Micro-optical drive technology will serve a wide range of products such as music players, digital cameras, cell phones, electronic books, digital appliances, games and computing devices that can easily and affordably share personal and published content. The market for these will boom in coming years, with extremely rapid technical innovation stimulated by Internet-related developments.

Soon, the convergence of the PC world and the consumer electronics domain will further intensify the demands placed on mass storage systems in terms of greater capacity and improved user orientation and user-friendliness.

A promising development is the emergence of the home server, or 'residential gateway' (RD), a concept having storage as a key functionality. This alone could have a profound impact upon many industries, stimulating the adoption of multifunctional in-home data networks and generating a greater demand for consumer electronics. Given its rapidly increasing capacity, HDD is likely to become the storage medium for tomorrow's home servers. Finally, in professional broadcasting, new methods are being explored as a means of reducing production costs. In this environment, camcorders with on-board HDD storage and connection to an IT network have a central role to play.

The products envisaged in the FUST project will make a major contribution in all of these key areas. They will be crucial to the transition from analogue to digital video recording, and will play an essential role in the convergence of PC and consumer electronic products.

Broad approach

At present, US and Japanese companies hold the strongest positions in the production of hardware components for storage in the consumer and professional fields. By concentrating on central issues such as the definition of standards, interfaces and generic architectures, the current project will help European industry to redress this situation, to stimulate the research community through the exchange of accumulated knowledge and technical experience, and thus leading directly to new product developments by the partners.

Among the main deliverables of the FUST project will be designs for codec (coding-decoding) and storage devices, based on a variety of interconnectable and interoperable building blocks. Feasibility studies will be conducted and demonstrator devices produced, including the first silicon realisation for the coding/decoding of multiple video/audio formats, and professional disk recording in a broadcast camcorder.

In order to reduce risk and optimise synergy from the start, the consortium is pursuing system definition based both on optical storage and on magnetic storage using HDD and LMT.

For example, in order to permit an HDD to be used in combination with an LMT or optical recording drive for consumer video recording, a number of new functionalities are being introduced. These include:

- Source coding such as MPEG-2 and MPEG-4 for video; and MPEG-1, MPEG-2, MP3 and AC3 for audio;
- Stream handling – (de)multiplexing of program and/or transport streams, buffering and bit-rate management;
- Management of files and disk content;
- Recording control;
- Communication with camcorders, TVs, PCs and home networks, plus fast Internet access via cable or telephone; and
- Copy protection – for example, using watermarking techniques.

Because of the rapid pace of change in this field, the consortium – led by Philips – aims to complete its work within a two-year period ending in December 2002. It is building on the know-how generated in earlier MEDEA projects, such as A151, covering generic video signal processing and scaling, and the storage-related A102 and A109 projects, as well as the current European Commission IST project G-FORS on new working methods in broadcasting. Some of the partners are also involved in other projects having storage as a focus. The EUREKA project BLUESPOT for instance, is addressing the physics, formats, optics and mechatronics of optical recording – while the ITEA project EUROPA is developing software components for security aspects of digital copying. Results of this research will be embedded in the developments of FUST.