2A20I: Facilitating high-definition media storage with Blu-ray Disc technology (BLAZE)

High-definition (HD) consumer video-electronics equipment will be introduced in increasing quantities into the European market over the next few years, but Europe is currently lagging behind its global competitors in development of the underlying technologies. An important aspect of HD is the availability of suitable storage media and systems. Leading manufacturers around the world are focusing on the innovative Blu-ray Disc standard as a potential low-cost answer to this need. The goal of the BLAZE project is to develop flexible integrated circuits, disks and content provision applications that will enable participants to build a competitive position in what promises to be a high-growth sector.

NETWORKED ICE TERMINALS

Partners:

CEA-LETI
DaTARIUS
INPG
MPO
Philips
Secuenzia
STMicroelectronics
Telefónica
Thomson

Project leader:

Wiel Louvenberg,
Philips Electronics

Key project dates:

Start: January 2005
End: March 2008

Countries involved:

Austria
France
The Netherlands
Spain

With the advance of new display technologies such as liquid crystal (LCD), plasma and liquid crystal on silicon (LCOS) in consumer electronic terminals, large high-definition (HD) screens will become increasingly affordable. A natural next step will be wider adoption of HD imaging. However, this will also depend upon the availability of suitable storage media to contain the large volumes of data required for distribution of feature-length films and other HD content.

Next-generation format

Blu-ray Disc (BD) is a next-generation optical disk data format developed by a group of leading consumer electronics and personal computer (PC) companies — including BLAZE partners Philips and Thomson — now known as the Blu-ray Disc Association. Because the technology uses blue lasers, which have shorter wavelengths than traditional red lasers, BD makes it possible to store substantially more data than existing CDs or DVDs in the same amount of physical space. Consequently it is likely to become a universal standard for video distribution, hybrid networking and streaming media applications, making it an essential component of

future home entertainment systems and portable appliances.

Major innovation

A major innovation is that Blu-ray is aiming to store 50 GB on a dual-layer disk of CD format through innovative high numerical aperture optics and new low cost, high resolution recording material. Further innovations in optics, drive technology and cost-effective transcoding chips will be required as multiple HD video standards emerge globally.

Rapid deployment of HDTV is occurring in the USA and Japan. A recent report of the Consumer Electronic Association reveals that first generation HDTV consumer displays are already installed in more than five million of the 100 million US homes. Another nine million households are likely to purchase HDTV products over the next 18 months and a further 30 million consumers consider themselves likely purchasers within three years.

In Europe, from now to 2014 households owning a 16:9 screen HDTV is forecast to grow to 30%. This will not only stimulate HDTV broadcasting, but customers will

also want home cinemas based on HD equipment and content.

BLAZE participants predict early introduction and rapid uptake of BD-based products such as HDTV recorders and PC drives. The trend towards digital convergence will also produce appliances featuring various combinations of digital TV, disk player/storage and set-top box functionalities. A BD recorder incorporating hard disk drive and a home server will become commonplace in tomorrow's audio-visual households.

Race for market

In recent years, application development and the market for optical disk devices have increasingly been dominated by Asian companies, both for key components such as chipsets and optical pick-up, and for finished products.

A first version of the Blu-ray Rewritable format has been released and Sony Corporation of Japan has introduced an early product. Some BD functionality has also been prototyped by Philips.

For European industry to participate significantly in the huge markets expected, it must quickly develop the necessary microelectronics and embedded firmware. The MEDEA+ 2A201 BLAZE project consortium aims to accelerate this process by combining the strengths of Europe's leading players in the field, establishing common standards and disseminating its results to other relevant companies and initiatives.

Solid ground has already been established in the successful MEDEA+ A202 FUST project that investigated various mass storage technologies intended for the consumer market and their suitability for digital rights management (DRM).

BLAZE is basing its activities on the most promising outcomes of FUST. Its goal is to provide a complete solution that will be inexpensive for end-users, yet make media content delivery a profitable business for all in the value chain.

In the first phase, the partners are defining the end-to-end architecture and functionality of an information, communication and entertainment (ICE) terminal. Its decomposition into subsystems and components will be described, enabling main system interfaces to be specified for content acquisition from broadcast and video-on-demand sources, and for BD drive-codec and codec-control/test firmware communication. Robust DRM is being incorporated to protect content providers.

This definition stage will guide elaboration of hardware and firmware for source decoding IC hardware with its associated firmware, as well as of the front-end module. Recent evolutions in system-on-chip (SoC) design mean an increasing proportion of the design effort is being devoted to firmware, rather than to pure hardware. Work will concentrate on audio codecs, graphics hardware, flexible video coding and decoding, transcoding and associated control mechanisms for playback, editing, archiving and disk management.

Development of a lowest-cost storage medium will include research into state-of-the-art hybrid materials and mastering technologies. Application studies will focus on the means of enabling the terminal to acquire HD content from broadcast and broadband suppliers, and to store it using personal video recorders. Pre-recorded BDs will be generated to test the microelectronics and firmware. Finally, a set of demonstrators will be produced, allowing the partners to undertake step-by-step validation of all concepts and outcomes.

Defending Europe

The project is a necessary counterbalance to the possibility of a completely PC-based (Wintel) solution, which is not in Europe's interest. The EU already enjoys a leading position in Java/media home platform (MHP) interactivity, which could be exploited to bring a Blu-ray product to the market within an acceptable timeframe. Suppliers of emerging interactive applications could exploit this advantage in the BD context.

Broadband access and transport technologies development are providing telecommunications operators with opportunities to offer new multimedia products and services. Until now, many of these were based on satellites and, because of their high cost, offered only to large enterprises and governments. With BD technology, distribution of high quality content using available broadband access fits with the critical cost requirements of the market.

BLAZE represents the opportunity for Europe to take the lead in optical storage systems and related chips, as well as building a strong position in the distribution of HD content. Significant market shares in the order of 30 to 40% for consumer equipment could be envisaged as a result of this project, which will also strengthen the European service industry — and thus have a positive effect on employment. Moreover, all citizens will benefit from the opportunity to enjoy higher quality entertainment.