

Advanced Digital TV Lab in VICOMTech - Real Synergy between TV and Computer Graphics

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German Abstract

Wegen der zunehmenden Nutzung von digitalen Technologien konnte die Forschung und Entwicklung im Bereich der grafischen Datenverarbeitung ihre Kompetenzen weit über typische Umgebungen (PCs, Großrechner, Laptops, etc.) hinaus ausdehnen. Es wird mittlerweile in/an einer Vielzahl von Bereichen und Geräten geforscht, wie etwa Handys, Spielkonsolen, PDAs usw. Solch ein neuer Bereich ist auch das digitale/interaktive Fernsehen. Die Möglichkeit, digitale Informationen zusammen mit dem traditionellen Sendesignal zu senden (und eventuell ein Antwortsignal zu empfangen) bietet der grafischen Datenverarbeitung ein neues Forschungs- und Anwendungsfeld. Das vielversprechende Potenzial, das sich aus dem digitalen Fernsehen ergibt, zieht weltweit die Neugier von Telekommunikations-Providern, Computerherstellern, Netzwerk-Providern, Konsumelektronikherstellern und Sendern auf sich. VICOMTech verfügt über ein voll ausgestattetes Digital-TV Labor, in dem die Möglichkeiten der grafischen Datenverarbeitung für das Digitalfernsehen erforscht werden.

Due to the increasing use and application of digital technologies, it is a fact that Computer Graphics R&D has extended its competencies far beyond the typical environments (PCs, mainframes, laptops, etc.) to a multitude of new devices and environments such as mobile phones, game consoles, PDAs, etc. One of the newest and most important areas in this transition is the digital/interactive television. The possibility of sending digital information such as applications, together with the traditionally broadcasted signal has opened a new field of research and application for CG. In Europe, the current situation is marked by the paradox of decided support from the EU and local governments and the technological uncertainties still remaining for the implementation of real applications. (The analog television will disappear in most countries in the European Union by 2010; sev-

eral countries are initiating digital emissions this year or next.)

The tremendous potential of digital television is attracting interest from telecommunications providers, computer manufacturers, network providers, consumer electronic companies, and broadcasters around the world. Companies are realizing that convergence among personal computers, television sets, and the Internet has already begun and they are positioning themselves to maximize revenues from this new paradigm of interactive services.

Digital and Interactive TV computing paradigm

Digital television offers many exciting possibilities and opportunities: interactivity, data broadcasting, electronic commerce, better pictures, Internet services, improved audio quality and new applications that have not yet been dreamed about. There is a wave

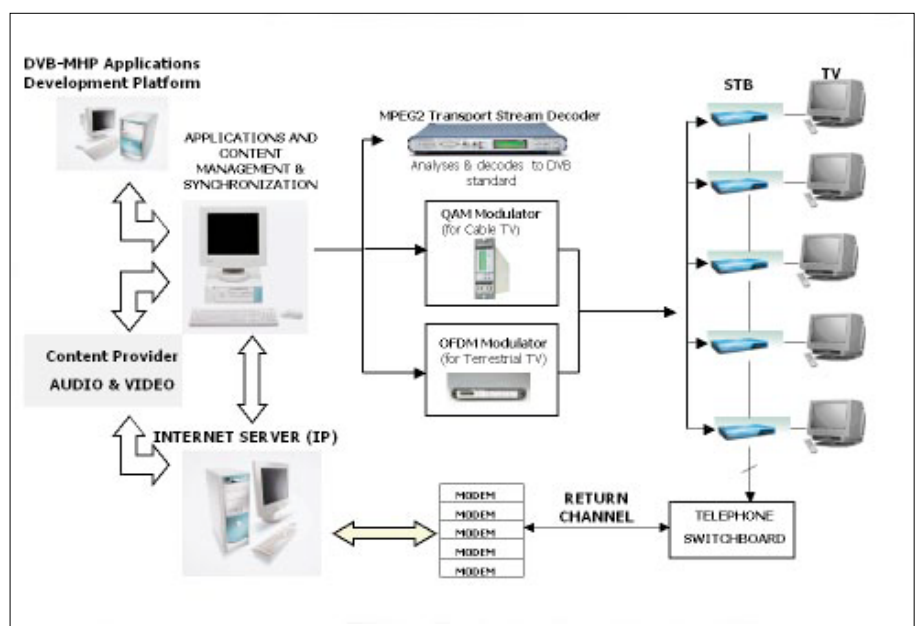


Figure 3: Interactive TV Main Components

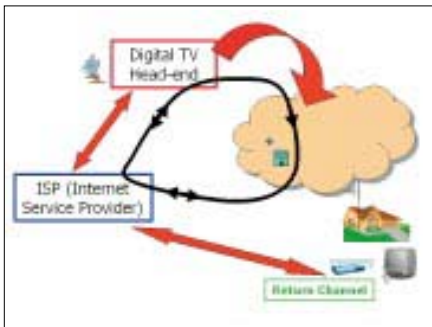


Figure 1: Interactive TV Computing Paradigm

of activity in the IT and broadcasting industry currently centered on providing millions of people with a suite of set-top applications that will firmly establish the next paradigm of interactive services through Digital TV. This new paradigm of developing interactive services for a set-top box-based architecture instead of a standard PC provides scientists and software developers with a wealth of new and exciting challenges and opportunities, Figure 1

As development of entertainment services for digital television markets gathers speed, software engineers and researchers are being challenged to develop a variety of Internet-TV-centric applications for the set-top box. Developing for a set-top environment is particularly challenging because they have (i) limited hardware resources, (ii) different distribution architecture and bandwidth for applications, and (iii) different interaction paradigms as when compared to a standard desktop PC.

Although some commercial, proprietary platforms for Digital TV already exist in the market, there is still a great need to fully exploit the real potential of this technology for interactive services. At this time, we are experiencing the first broadcasting of digital TV that follows the European standard DVB-MHP (Multimedia Home Platform). This new situation will help the development of new interactive services on a broad scale, based on open standards, that will benefit greatly from Computer Graphics expertise

in other contexts. The fact is that there are still many matters to be resolved (lack of commercial set-top boxes for MHP terrestrial reception, for instance). Implementations of the standard are in most cases partial. Nevertheless prospects are very promising.

Content providers and users find themselves in a situation of double uncertainty: the purely technological questions, related to Digital TV definitive standards, and also the main difficulty, the need for new paradigms required to develop new applications or adapt existing ones to the new environment.

Interactive TV Laboratory at VICOMTech

VICOMTech has designed and built an interactive TV Lab, containing the hardware and software for the main technological platforms involved in the deployment of Digital Interactive TV Applications and Services that support DVB-MHP standards, Figure 2.

The main purpose of this Lab is to experiment, to simulate and to contrast different interactive TV approaches in order to research the most relevant issues which have arisen when developing Digital TV applications and services for a set-top box environment.

A very important issue to be explored is the way the existing expertise and accumulated knowledge in CG can be exploited and reused to adapt (or augment) existing applications for Digital TV, as well as the establishment of a framework for developing applications in this new computing paradigm. The full exploitation of the possibilities offered by the return channel and the Internet access is another key issue to be considered. Usability, integration, interactivity, adaptive user interfaces, etc., are some of the aspects that need to be addressed from a general framework, before specific contents and applications are implemented. Special features (advantages and restrictions) of the new digital TV architecture must be taken into account, as

well as new application possibilities opened by the combination and synchronization with the broadcast signal, which need to be investigated.

The overall TV Lab structure considers its different functional parts: applications development, integration of applications and A/V content, broadcasting unit, set-top boxes for reception, return channel and its management, Figure 3. Some of the technological objectives pursued are:

- Evaluation of tools and programming environments available for design and development of interactive services.
- Study of interactive services implantation methodology, as well as their development cost evaluation.
- Evaluation of Digital Head End functional requirements.
- With regard to the Internet access, researching of technological needs to be met both at the Head End and at the users' Set-top box.
- Evaluation of user response to TV interactive services.

The new Interactive TV Lab of VICOMTech will contribute to supporting, promoting and assisting content providers and users in using interactive technologies as a tool for the improvement of their efficiency and competitiveness. It will also consolidate VICOMTech as a reference technological centre for the multimedia sector.

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