

The DVB Multimedia Home Platform

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In 1997 the DVB Project expanded its scope to cover the Multimedia Home Platform (MHP) comprising the home terminal (set top box, TV, PC), its peripherals and the in-home digital network. From a service and application point of view enhanced broadcasting, interactive services and internet access will be covered. The intention is to develop standards and/or guidelines to create a basis for an unfragmented horizontal market in Europe with full competition in the various layers of the business (value) chain. A crucial role will be played by the Application Programming Interface API. A comprehensive set of user and market based commercial requirements have been approved and are now used to produce specifications.

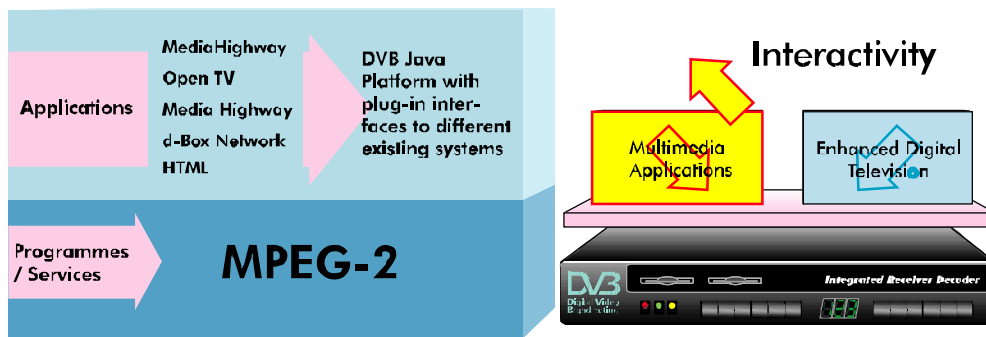


FIG 1: The DVB MHP - the end of broadcasting as we know it?

The Next Wave in Digital Video Broadcasting

Since the DVB project was established in 1993, it has produced a large family of specifications for almost every aspect of digital broadcasting, which have been adopted through ETSI (The European Telecommunications Standards Institute) as formal European standards.

Numerous DVB-type services have been introduced since then in Europe and worldwide and the number of services on the air is growing exponentially. Today, we can say a miracle has happened, possibly the most important technical and commercial miracle since the foundation of the World Wide Web. DVB is *the* global solution for digital television and related multimedia services.

This phenomenal commercial success is largely due to the market-led approach of DVB. This is reflected in a well-defined discipline, according to which the development of technical specifications has to follow market- and user-based commercial requirements. It is also reflected in the DVB structure through the existence of a Commercial Module defining the commercial requirements and a Technical Module producing the specifications and in some cases associated guidelines. The deliverables of both groups have to be approved by the Steering Board. The whole process is based on consensus.

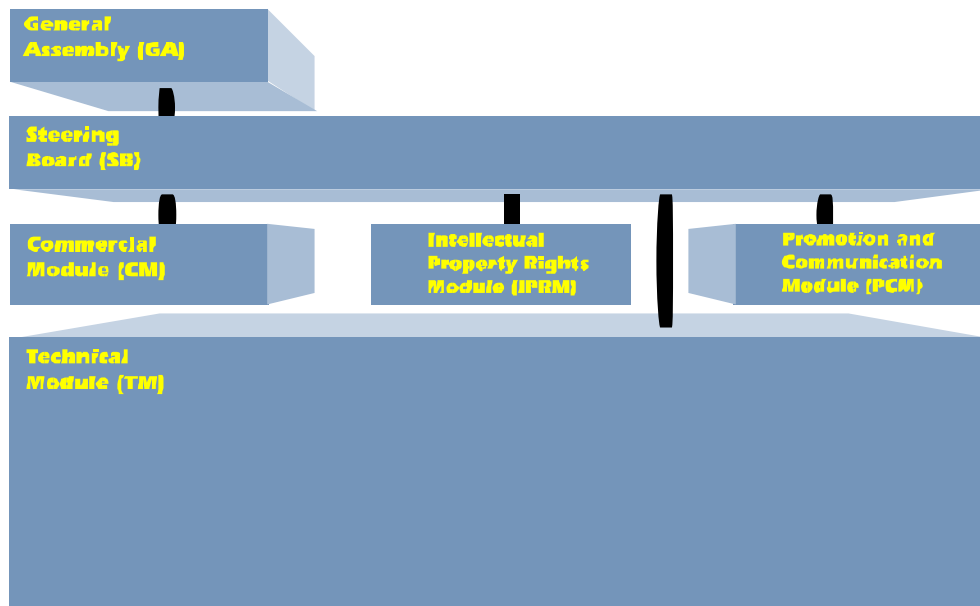


FIG 2 - The structure of the DVB Project puts the Commercial Module above the Technical Module - this forces work to be market-led.

In this business driven framework, priority was given initially to the infrastructure elements of the standard broadcast chain. In a second step, the scope was expanded to the infrastructure layers of interactive services. Recognising the need to address the convergence of broadcasting, computer and consumer electronics media in the home, some DVB members began also to examine the implications the new digital technologies will have in the home and the role this area will have in creating a large unfragmented market.

As a result of these discussions, the DVB Steering Board decided to enlarge the DVB scope also in this direction, and the Multimedia Home Platform (MHP) Group within the Commercial Module was established. The MHP work has since then become a core activity of the DVB project and a first set of commercial requirements defined by the MHP group were approved by the Steering Board in December 1997. The underlying general objectives of the requirements are to build a bridge between the hardware and the software worlds, the consumer electronics and computer worlds, and the existing and future business environments.

A guiding principle is not to compromise existing businesses. Each of them shall have an opportunity to migrate to the future common solution.

Within the Technical Module, the TAM (Technical Aspects of MHP) Group has now become active. The group is working today on delivering the technical specifications. In parallel, the MHP group will continue to work on purifying the commercial requirements. Both groups collaborate closely, as the complexity of the matter requires close interdependency without deviating from the market-led principle. Technical specifications once approved by the Steering Board will be submitted for formal standardisation.

Convergence is only possible in an unfragmented market

In its first phase the DVB project focused its standardisation work on the broadcasting infra-structure. A comprehensive set of standards was delivered, including broadcast transmission standards for different transport media (satellite, cable, terrestrial, etc.), service information standards related to services and associated transport networks, and transport related standards for interactive services using different types of return channels (Cable, PSTN, ISDN, GSM, etc.).

Although these standards are essential for DVB, they have so far not led to a common horizontal European market for DVB. Instead, in the current pioneering phase, several vertical markets have been established, in which a single programme/service provider or a single group of programme/service providers controls the business (value) chain. These markets are characterised by the use of proprietary API's, e.g. MediaHighway (Canal+), Open TV (TPS and others), d-box Network (Kirch Group).

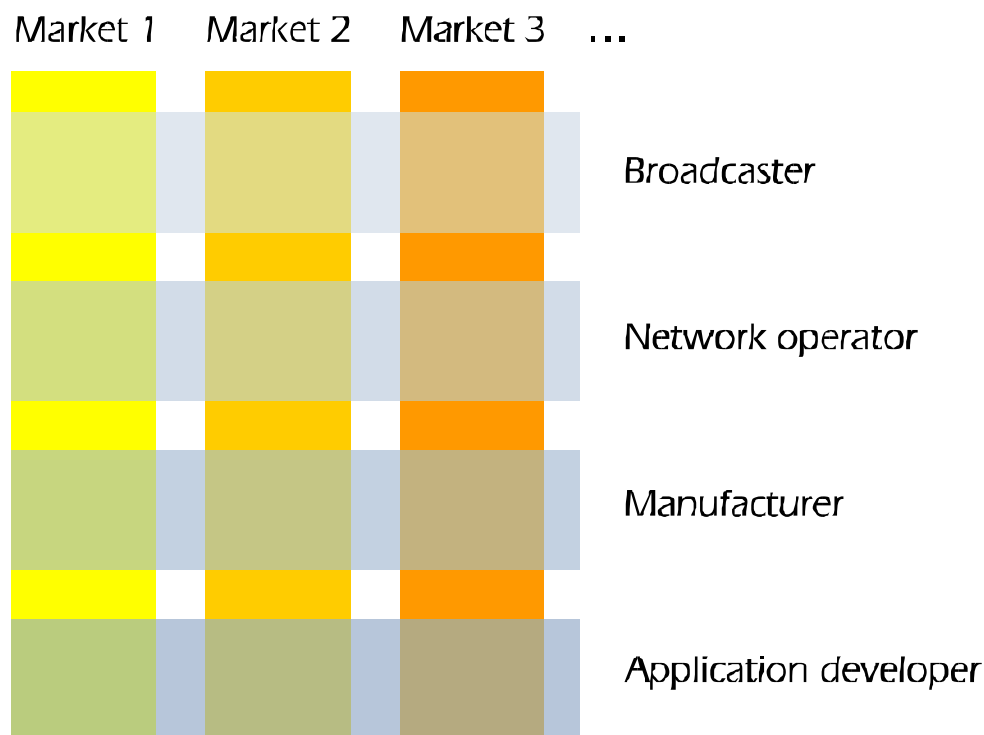


FIG 3: Future Horizontal markets will evolve from existing, fragmented Vertical Markets

The inevitable problem has arisen that applications and set top boxes using different API's are incompatible with each other. An end-user wanting to have access to all the DVB services available today would have to buy several set top boxes. This forms a considerable road block in building full confidence of consumers in the future of digital TV services. Full confidence of consumers and the final breakthrough of DVB will only be achieved in a common horizontal market with full competition enabled by clearly defined interfaces between the various layers of the business chain and with a "standardised" receiver / home terminal (set top box , integrated TV set , PC) based on a common API.

The vertical markets were important to achieve the "critical mass" necessary to start the horizontal markets. In a common horizontal market, any application provided by any programme/service provider via any network can be "understood" by all receivers. A horizontal market benefits also from the competition amongst the players in each layer (content providers, programme/service providers, conditional access providers, network operators, receiver manufacturers). Only a horizontal market will support and accelerate the convergence of broadcasting, computer and consumer electronics in the home.

Thus the expansion of the DVB project focus to the standardisation of a multimedia home platform (MHP) was the only logical step forward. Aimed squarely at achieving full convergence, the MHP comprises the home terminal (set top box, integrated TV set, multimedia PC), its peripherals i.e. the local cluster, and the in-home digital network. From an application point of view, advanced broadcasting with multimedia data applications arriving alongside conventional linear broadcasting, interactive services using a return channel, and internet access will be covered.

The work on the multimedia home platform constitutes a move of DVB from the infrastructure to the higher layers of the information system. The API, as already mentioned, will form a core element. It is a precondition for advanced multimedia data applications like electronic programme guides (EPG), games etc.

Basic requirements for the multimedia home platform and its API

According to DVB's market-led discipline, any work on MHP requirements started from real applications and business needs. Following this approach two basic groups of requirements were identified:

- basic requirements,
- application oriented requirements.

The MHP and its API have to fulfil a variety of basic user and market requirements. These requirements have been identified in order to deliver bridging between:

- the hardware and the software worlds
- the consumer and computer worlds
- the existing and future business environments

thus providing a harmonious evolutionary path from today's fragmented vertical markets to future unfragmented horizontal markets.

The following is a selection of key elements from the basic requirements list.

Interoperability - The MHP specification including the API shall support a full range of services and low to high functionality implementations and shall be network and hardware-platform independent. This neutral approach will prevent lock-in to any proprietary format or single vendor etc. and allow cost-effective products to be produced using technologies from freely competing vendors.

Evolution, scalability, extensibility and backwards compatibility - The MHP solution shall be designed to be extensible towards future functionality. Scalability and backwards compatibility shall be maintained.

Scalability means enabling low-end and high-end terminal devices (e.g. simple set top boxes and PC theatres) as well as the whole platform to serve low- and high-end user requirements, respectively.

Enhancements to future MHP products in terms of hardware and software capabilities shall be backwards-compatible with previous generation MHP solutions, so that future MHP applications do not crash older MHP's and that older MHP's are able to provide some level of user-experience of the broadcast applications. Existing applications must be able to run on new generation devices.

The level of the user experience shall be scaled down according to the hardware capability. Capabilities shall be provided by the API.

Modularity - The MHP solution shall be modular, allowing a number of distinct product levels offering trade-offs between the scope of services enabled by the MHP's functionality and the complexity (cost) associated with its implementation.

Stability - Consumers shall have confidence in the market-place and the perceived longevity of MHP products. The basic MHP solution shall be stable over time, with well defined extension procedures for future enhancements.

Migration - A possible migration path shall be defined to evolve from the current situation based on proprietary systems towards the future common MHP environment, including the API.

Based on open standards - The MHP system shall be based on existing standards, if available. Existing solutions available on the market, or any other solution that may seem appropriate should also be considered under the condition that each solution feature is disclosed and properly documented. The MHP system shall be fully published and accessible through a recognised standards body.

Upgradability / Downloadability - The definition of the MHP system shall not prevent firmware upgrades. The MHP shall be able to be upgraded through the network in an environment where several receiver implementations co-exist.

Controlled development path - The evolution of the MHP system over time shall be maintained by consensus through industry-wide bodies (e.g. under the control of both service providers and manufacturers).

Simplified and cost-controlled operation - Applications and data shall be transmitted in a bandwidth-efficient format that allows applications to be transmitted only once, therefore avoiding unnecessary simulcasting. In order to do this, MHP solutions shall be based on the separation of data from the applications. This shall enable different applications to use the same data. For an EPG as a typical application, this means use of the DVB service information (SI) data to the largest extent possible without the need to transmit this information as part of the EPG application.

Generic API - A single generic API shall be the target to be used in parallel to existing proprietary API's. It shall

- allow to support real-time streaming applications, downloaded and locally stored applications,
- allow any broadcaster or any application provider to write and supply applications,
- allow the look and feel of all applications to be under the control of the broadcaster and/or application provider,
- provide access to the DVB-SI data,
- allow any manufacturer to implement the API in its own way.

Application-oriented requirements

Based on short- and medium-term business plans of broadcasters and service providers and an associated roadmap of services / applications, three main areas of applications were identified:

- enhanced broadcasting with local interactivity
- interactive broadcasting using a return channel
- internet access

Commercial requirements were derived for each of these areas. These requirements must be supported by the multimedia home platform and its API. In addition benchmark applications were used to define requirements being exemplary for the application area under consideration.

Enhanced Broadcasting: 2 levels of navigation

For enhanced broadcasting the built-in navigator and the electronic programme guide (EPG) were identified as benchmark applications.

Built-in navigator - In the MHP concept the way to guide the viewer to a special event within a programme/service comprises 2 levels of navigation. After switching-on the receiver an overview of all services or bouquets of services available on the network to which the receiver is connected may appear on the screen. This overview is provided by the built-in navigation function of the receiver. It is called the built-in navigator. This navigator makes use of the SI data supplied by the network operator. It will also utilise the SI data provided by the service itself and give information on the events within a programme/service.

The built-in navigator identifies and allows selection of all available events to which the user could be entitled including all services in the clear for all networks the multimedia home platform is connected to. It presents information about all services without necessarily going into specific detail. Each multimedia home platform provides a built-in navigator.

As the navigator is a built-in function of the receiver, its functional complexity and its look and feel are determined by the manufacturers and form an important element of competition.

Electronic Programme Guide (EPG) - Having chosen a specific programme/service, the viewer may then select the associated EPG, if available. Alternatively he may also switch to the EPG from a specific independent provider.

The EPG constitutes the second level of the consumer navigation system giving detailed information on the contents of programmes/services and their events. The EPG forms a user interface which can be provided by different parties (e.g. broadcasters) to present a group of services (e.g. a bouquet). The functions and look and feel of the EPG reflect the editorial freedom of each EPG provider. The EPG itself, therefore, cannot be standardised. However, its requirements must be supported by the multimedia home platform and its API.

The following is a selection from the list of requirements:

- It shall be possible for the party which provides the EPG, to determine its look and feel.
- Information structures shall be based on the DVB-SI and DVB-SI DAT data broadcast specifications. Additional improvements to these standards may be required in order to provide new kinds of services and performance.
- API system and information structure definitions shall be decoupled as far as possible.
- It shall be possible to make use of differences in the capabilities of user terminal de-vices enabling an EPG application to serve low and high end user requirements, de-pending on the platform, in a scaleable way (computing power, DRAM, I/O and storage device capabilities and display performance are varying parameters).
- The system shall not preclude the possibility to mark events (such as "I want to watch this") and control other CE devices based on events, for which adequate mechanisms for the storage of customised and event-specific data shall be defined.
- The MHP mechanisms shall not prevent the incorporation of video and still pictures in an EPG.
- The retrieval of programming information shall be flexible in terms of data sources, the EPG shall e.g. be able to collect information from a broadcast signal as well as from peripheral devices as well as from a back-channel link to an on-demand service centre.

Reference Model¹

So far the DVB-TAM has succeeded in defining a common generic reference model, shown in Fig. 4.

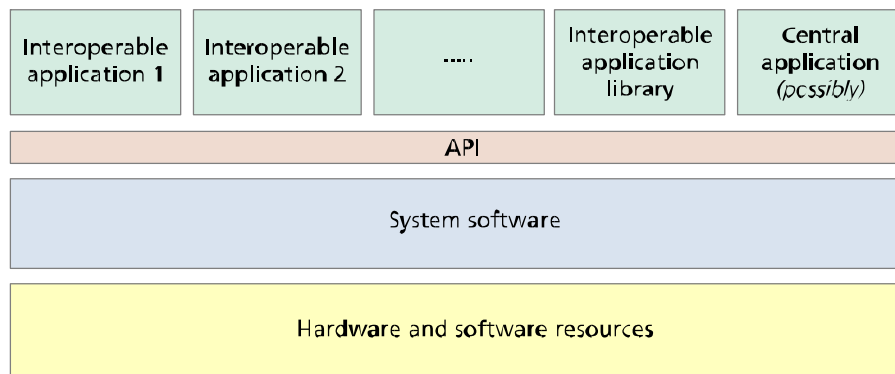


FIG 4: The DVB TAM Reference Model (Illustration - J-P Evain)

Each application that is developed will need to comply sufficiently with the reference model to ensure cross-platform interoperability in a competitive environment. This should result in host platforms where the integrity of the application is protected, and its behaviour is stable and predictable (thus resulting in a high quality of service). The reference model must also define modes for data delivery, memory handling, object handling and instruction execution.

On the edge of a bright future

The work on the DVB multimedia home platform is progressing fast, Therefore this report can only provide an intermediate picture. If the planned deadlines can be kept, first specifications will become available in 1998 and lead to a fast implementation of standardised products in hardware and software, paving the way to convergence and a common horizontal market.

At the same time migration concepts will have to be developed for services and receivers and their related APIs in the already existing markets. Finally after convergence has occurred, a permanent evolution of the MHP standards needs to be ensured. This should be done in an open forum. The resulting improved APIs should be downloaded to the receivers in the home, thus permitting a continuous upgrading of the Multimedia Home Platform.

¹ This section comes from an article written by Jean Pierre Evain (EBU), secretary to the DVB-MHP Module - **The Multimedia Home Platform - An Overview**, published in the August issue of the EBU Technical Review, available on the DVB Web Site (<http://www.dvb.org>).