

NEW INTERACTIVE SERVICES FOR DIGITAL TELEVISION

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1. Motivation

The television has been losing relative importance, mainly due to alternative content consumption devices with Internet access, like computers, tablets or smart phones. These devices allow new ways of interaction with content that are not possible with the current television model, leading to a loss of viewers that translates into loss of revenue and decrease in the quality of the final product. This loss of quality ends up prejudicing viewers.

Besides this, interactive services are usually provided by content providers, preventing producers from providing their services directly to end user.

2. Main goals

The aim of this dissertation is to design and develop a solution of interactivity in the context of linear television consumption in Smart TVs. The solution must also avoid complexity, like dedicated hardware, and synchronization problems detected in other solutions. In addition, there should be the producers who specify the complementary information. To achieve this goal, a number of challenges need to be addressed notably:

- Identification of the type of interactivity that should be offered to the user;
- The type of metadata required and how to represent it;
- How to add this additional metadata to the linear TV signal;
- Specification of a software layer to handle the metadata at the client side and how to deliver it to and run it in the client;
- Facilitate the development of metadata.

In technical terms, the developed solution should comprise the definition of the format and the method to embed metadata in the broadcasted signal. This metadata should be used by a software layer on the Smart TV, adding interactivity to the viewing experience. This interactivity should have additional content, synchronized with linear transmission, and be sent through broadcast or Internet.

3. Work description

3.1. Interactivity model

The proposed interactivity model is similar to the one being used in the market, consisting of unidirectional distribution of complementary information to the linear programming. This information, inserted by content producers, should be locally navigable in the client equipment through the remote control. Text, images, videos or links to relevant websites are among the relevant information that could be included.

3.2. Requirements

Given that the solution to be developed ranges and encompasses the entire audiovisual contents production chain, differentiated requirements were defined for each stakeholder. Despite this, common aspects to more than one stakeholder may be found, allowing the definition of a set of features that the solution must have:

- It should allow the definition of content and how to represent it in a flexible manner and with distributed responsibilities;
- It should allow all elements that constitute the interactive content to be distributed through different platforms;
- It should be easy to implement, using technologies that already exist and allowing the adaptation of already implemented workflows.

3.3. System development

In this dissertation it was developed a generic application that runs on the client side, in a Smart TV. This application uses HbbTV[®] and runs automatically when the viewer tunes to the TV channel that signals it. However, no information is shown until there is permission. The application may either be sent with signal transmitted, through the DSM-CC, as via Internet. It was developed in HTML and JavaScript and is divided in three modules that interact between them: metadata, templates and HbbTV[®].

One MPEG-7 relevant characteristic is that it allows the association of an annotation to a temporal moment. This is important to guarantee that the content is synchronized with the transmission. From this base it was added an extension that allows the annotation

of interactive content. These annotations provide information to spatially locate the content on the screen and allow the definition of any variables that producers need. However, since it is intended an interoperable solution the concept of profile was also defined. A profile is a representation of a subject of interest to the audiovisual market (advertising, sports, theater, cinema, etc.), defining a set of variables, hierarchically organized, that describe it. Arrived to the client application, the metadata is imported and converted to a simplified version, in order to facilitate the querying. It was also implemented the possibility of referencing external annotations, localized on a server. This way it is possible to personalize the viewer's metadata, since an Internet request is accompanied by information that can be used to, for example, locate him.

The templates module imports the code of the templates to the application and combines it with the metadata from the module described on the last paragraph. This separation allows a greater flexibility, distributing the necessary work through the chain. This aspect is important so that the solution is more easily acceptable for the stakeholders of the chain and allows reutilization of a template with different annotations, decreasing the information sent to the client's equipment. To facilitate access to annotations' data it was defined a function that simplifies this process.

Finally, the HbbTV[®] module interacts with reception equipment, with the viewer and with the stream events. These events are sent from the broadcaster and instruct the application when to show or hide the complementary information to viewers.

Because not all viewers tune the channel that transmits the application at the initial time of the program, the application is ready to show information that should have been shown in a preceding time point but that still remains valid.

3.4. Tests and validation

To evaluate the work was intended to verify that, indeed, such solution was possible, proving that the additional information arrives to the customer, is presented according to the specification of metadata and is usable by the viewer. It is also important to check that

the metadata is synchronized with linear programming, showing the information in the corresponding time period.

A set of tests were defined to cover all requirements and defined a use case that confirms the applicability of the solution. Advertising was the area chosen for the use case since it is one area producers have great interest in. This consisted of information on a car during its analysis on a TV show and during a commercial.

To be able to test the events and the applicability of the solution in the real world, it was used the Avalpa server for sending the signal to a Smart TV.

All tests had positive results, however some aspects that need improvement were found, including the elements navigation via the remote control.

3.5. Real life integration

Although not implemented, it was studied how to integrate the solution in the production chain. Given that is normal the use of the MXF format for exchanging audiovisual material across the actors of the chain, these can be used to transport metadata and templates. This way, the information travels integrated and allow the creation of an application that would recognize and transmit them automatically to the viewer.

4. Conclusions

From the analysis of the results it is concluded that the objectives were met. The solution is flexible, allows the creation of synchronized interactive services synchronized with the transmission, does not require new equipment, there were used Smart TVs that are on the market today, and allows for easy content creation and the distribution of work across all actors in the chain. The changes necessary for its implementation are reduced, allowing the creation of new revenue streams while improving the service provided to the end consumer.

Despite this, some areas that need improvement were identified, including the optimization of the application so that it can launch quicker, the improvement of the content navigation via remote control or the adaptation of the solution to live broadcasts.