porTiVity: new Rich Media iTV Services for handheld TV

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Abstract

The porTiVity project will realise direct interactivity with moving objects on handheld receivers, which are connected to DVB-H or DMB as the mobile broadcast channel and to UMTS as the mobile communication channel. porTiVity will develop tools which enable producers to link Rich Media information with objects in the TV-program. The project will further develop the playout for portable Rich Media iTV and the middleware, data and presentation engine in the handheld receiver. For the application layer, the project will make use of international standards such as MPEG-4 A/V, MPEG-7 Metadata, MPEG-21 DIA and MHP. On the distribution side, the open standard MXF is used as material exchange format.

1 Introduction

The porTiVity project is developing a converged Rich Media iTV system which integrates broadcast and mobile broadband delivery to portables and mobiles, and which will enable the end-user to act on moving objects within TV programmes. porTiVity will combine and further develop the technical achievements from SAMBITS (Rich Media iTV supported by MHP), SAVANT (quasi-synchronism of scaled Internet and broadcast content) and GMF4iTV (interactivity at the level of moving video objects) towards handheld TV.

GMF4iTV has shown that interaction at object level is highly attractive to the consumer [1]. porTiVity will widen the scope to handhelds which are, in contrast to TV-sets, personal devices at "hand distance", and thus ideally suited for interactivity and personal services.

The project combines the necessary expertise of broadcasters, playout-specialists, network operators, middleware developers as well as handheld terminal manufacturers across Europe and will contribute to the further development of international standards, notably DAB and DVB.

2 Interactivity as a key-factor for handheld TV

The main objective of the porTiVity project is to develop and experiment a complete end-to-end platform providing Rich Media interactive TV services for portable and mobile devices. Current developments in mobile multimedia show an uptake of mobile video and TV-related services. Interactivity on mobile devices has played an important role from the moment they came to the market, and is being enabled further by integration of browsers, mail-clients and games that run on the latest generation of mobile phones.

It can be expected, that interactivity and personalisation will become key-factors in portable and mobile enhanced TV services. However, the interactivity, the composition of Rich Media iTV service and the access to the content have to be adapted to this new generation of multimedia handheld receivers and to the delivery to these devices.

Based on the experience in GMF4iTV, porTiVity will design new components, integrate and expand existing tools to develop and demonstrate a portable and mobile Rich Media iTV end-to-end system, from the video production site to the final user terminal. This system will contain:

- A special annotation tool, which can be used to create Rich Media iTV content, for both, pre-produced, as well as for live broadcast. This tool will contain several productivity enhancements to define and label moving objects in the video stream. This tool will allow video producers to easily compose Rich Media content by:
    - Defining moving objects in the video stream;
    - Annotating those objects with additional content;
    - Providing personalization information for both objects and content.
- Automatic processing and adaptation of content for delivery and display: the content previously created by the annotation tool will be automatically adapted to the delivery channel and user terminal, through coding and/or transcoding (both for video data and metadata), synchronization and signalling to ensure the on-time delivery of data. This process will benefit from GMF4iTV and SAVANT. MXF (Material eXchange Format) will be used as the common synchronized format for interconnection between annotation suite and playout. For this purpose the functionalities of MXF will be extended for considering the annotation of synchronized rich-media interactive TV content.
- Content delivery via broadcast and broadband network: porTiVity will develop and integrate the tools to distribute Rich Media iTV content through both standard broadcast networks (with DVB-T/-S fixed receivers) and wireless broadcast networks such as DVB-H and/or DMB/DxB. A multiplatform system, similar to the one developed for the SAVANT demonstrator, will be developed. The content and metadata adaptation for heterogeneous networks and terminals will be based on MPEG-21 DIA descriptions. A strong cooperation between porTiVity and INSTINCT is envisaged, to build on top of INSTINCT developments.

- Definition of an appropriate middleware for interactivity for portable terminals, considering both high-end and low-end receivers. It is planned to amend the current MHP specification and API by considering portable interactivity, object interactivity and personalization aspects specific for personal devices like handheld terminals.
- Definition of interactive mobile broadcast services and realization of user tests: based on user requirements (both service consumers and service creators), porTiVity will define a set of reference service scenarios to demonstrate the feasibility and attractiveness of the complete chain.

3 New interactive broadcast services for handhelds

Concerning the service production side, porTiVity will especially account for the needs of broadcasters as to integrating such tools and systems in their daily productions process and digital workflows, and regarding tool handling with producer friendly user interfaces. Particular value for service providers will be generated by the porTiVity annotation tool, providing them with the opportunity to add additional information directly to (moving) objects for mobile broadcast services. Hence, porTiVity would pave the way for the adaptation and enhancement of today's digital broadcast processes for future mobile broadcast service production, which thus will become part of their programme and service bouquet.

Furthermore, porTiVity investigates mobile broadcast networks and services by comparing the capabilities of namely DVB-H and DxB (DMB), e.g. as regards how optimum synergies between broadcasting and mobile networks and services could be reached, and will examine what their requirements and implications are for broadcasters, in particular for European public service broadcasters. This is expected to provide valuable input to broadcasters, in particular for their decision to invest in one or the other network technologies, and to increase their knowledge and awareness for future mobile service production. Beyond, broadcasters currently providing DVB-T services could herewith build up upon their previously gained experiences and increase their know-how on this significantly.

For service consumers, porTiVity offers services that will allow them to receive Rich Media iTV broadcast services not only at home on the traditional TV set, but also more independently of location, on small portable and mobile devices. Such mobile interactive services would offer added value to end users by providing additional and background information, which is related to certain objects or events and which will be accessible via simple clicking on one object of the current program. This visual approach does perfectly apply to audio-visual broadcast services and, as to service handling, is very appealing to small portable devices. Furthermore, personalization features offer to individualize these mobile services: users will have the opportunity to sort the additional information they are interested in, according to

their personal preferences and/or to receive only the additional information they are interested in.

Developing end-to-end production tools and technologies for such added value services, porTiVity will enable broadcasters to produce services that are really in line with their audiences needs. Such services would go beyond today's user habits via enhancing traditional broadcasting services, making them interactive and personal, and adapting them perfectly for usage on mobile end devices to an as wide spectrum of users possible.

First prototype handheld multimedia terminals exist for DVB-H as well as for DMB. The DMB terminals are available already for the introduction to the market in South Korea. However, both terminals do not allow for advanced interactivity with TV programmes. The problem of the DMB system is, that the interactivity layer is based on MPEG-4 systems, a technology, which is not used in European interactive TV systems. This means, DMB in its current form does not provide any common ground with the production of interactive TV-services in Europe. It is very unlikely, that the broadcasters will and, for cost reasons, can develop special targeted Rich Media iTV services for handheld terminals, rather than scale their services, which are made for stationary receivers, down to handheld receivers. It is important to recognize, that for the broadcasters, in contrary to the mobile communication providers, the portable and mobile broadcast systems will not evolve as a complete new market, rather than as an additional distribution platform to convey their state-of-the-art iTV services in a scaled way to a new entity of receivers. This means, that MHP applications have to be downscaled to handheld receivers. In addition, neither DMB nor DVB-H terminals provide at this stage a direct interaction with objects, as developed in the GMF4iTV project for stationary MHP terminals. In principle, the technical platforms and computing complexity to realize such a high degree of interactive services on handhelds exists; however, the necessary system architecture and software developments have not been realised so far.

4 Conclusion

GMF4iTV has clearly demonstrated that direct interactivity, based on moving objects can be implemented on a state-of-the art handhelds. This means, that porTiVity will significantly contribute to the development of new systems for Rich Media iTV to portables, which are perfectly suited for a high degree of interactivity as well as for highly personalised services. Based on object tracking, porTiVity will allow for direct interactivity with moving objects, in order to realize a very intuitive way of interactivity for the user.

References

[1] Alejandro Lopez, Miquel Noe and Gabriel Fernandez (URL). "Linkage of additional contents to moving objects and video shots in a generic media framework for interactive television", SPIE Conference, Optics East, ITCom, 5600-5, Philadelphia, 25. Oct. 2004