PERSONALCASTING
Personalization on Datacasting

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Abstract: Digital Terrestrial Television (DTT) allows the simultaneous transmission of different digital contents with the video signal, i.e. datacasting. This become possible due to coding and compression technologies used to process the signal, not previously available with analogue technology. This subject created the discussion about the digital dividend, which addresses the best way to use the spectrum, so as to improve its efficiency. This article presents the concept of Personalcasting applied to data, which is sent simultaneously by DTT to the entire coverage area, while directing contents to specific users. This provides a better use of the DTT spectrum, due to high data volume that will be used with datacasting.

1 INTRODUCTION

Bove, in 1985, introduced the concept of Personalcasting, "Personalization on Broadcasting", which was revolutionary at the time, for it provided convergence of TV with computer data, allowing a VCR recorded program to be put into words with the support of information provided by the closed caption. However, the advent of Digital Terrestrial Television, using Advanced Television Systems Committee (ATSC), Digital Video Broadcasting - Terrestrial (DVB-T) or Integrated Service Digital Broadcasting - Terrestrial (ISDB-T) standards, allowed the possibility of data broadcasting, which in some countries due to regulatory matters, contains a connection of up to 14 Mbps (Montez & Becker, 2006) and, consequently, created a discussion about the "digital dividend", which deals with the optimization of the spectrum. Thus, broadcasters will be able to apply a variety of services and multimedia to their systems, which will simultaneously be available to television viewers. A considerable amount of information may be available, which implies the need to use selective technologies that allow the user to receive contents and services of his interest. To materialize this, a new concept of Personalcasting "Personalization on data broadcasting" is proposed, which deals with sending information through a DTT data channel to a specific user or group of users. The proposed model addresses the personalization of content in the three levels of connectivity with TV broadcasting (Lemos et. al., 2004), and the interaction occurs even without the need for a return channel. This system is very flexible and it may have high impact due to the fact that television has high penetration and numerous applications that can be performed.

The article structure is as follows: section 2 presents key topics related to DTT datacasting; section 3 defines the proposed model of Personalcasting, which is materialized with an example to quantify the system and its many potential applications. Finally, section 4 presents the main conclusions.

2 DATACASTING

We usually refer to a data broadcasting system when it distributes data from one point to many others. With the generalization of digital formats, including digital animation and others behind simple audio and video, many broadcasters are now defining "datacasting" due to the inclusion of, these aggregated formats to the spectrum previously meant for broadcast (Jones et. al., 2007). Therefore datacasting can provide substantial advantages to

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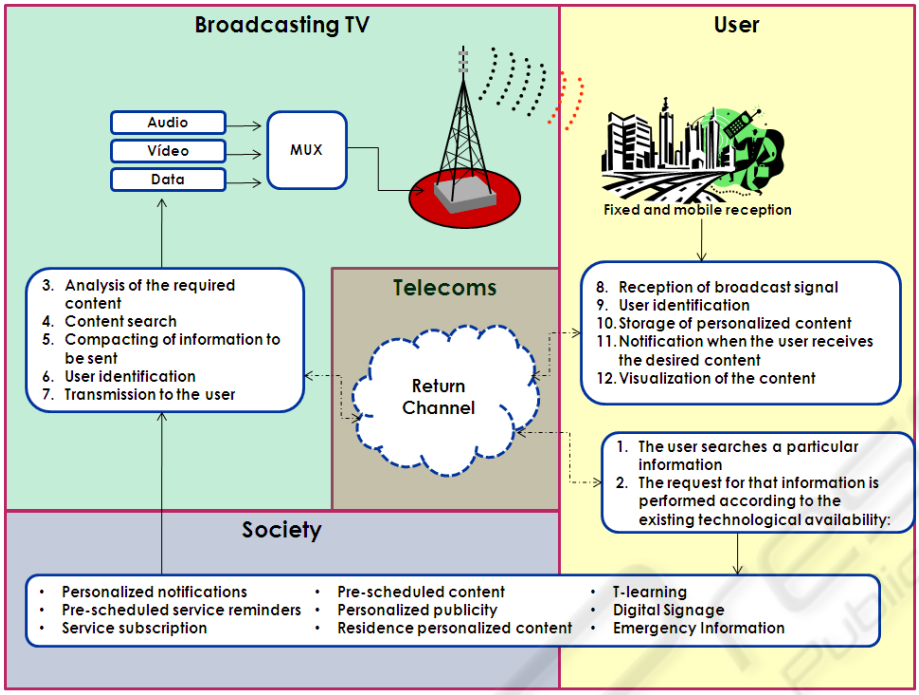

Figure 1: Proposed system.

complement, substitute or even to bring digital technologies where there were no infrastructures. For example, datacasting can provide broadband internet distribution to some populated areas, reaching millions of people with low cost.

However, datacasting is restricted by regulatory matters directly related to the standard used. Below is an example of the data rate that can be used in the three most usual standards of DTT on a 6 MHz band (Wu, 1999).

Table 1: DTT Standards data rate.

DTT Standards	Data Rate
Specifications : Mod.=64QAM(8VSB, OFDM) FEC=3/4 IG=1/16 BW= 6Mhz	
ATSC	19,4 Mbps
DVB-T	19,6 Mbps
ISDB-T	19,3 Mbps

These data rates are shared between different sources of video, audio and data, with datacasting, in countries where it is allowed by regulation, and it can be broadcasted simultaneously using SDTV for programming, up to 15 Mbps (table 2) of data on a 6 MHz channel (Montez & Becker, 2006). However, these calues can changeaccording to modulation specifications, video compression and signal to noise conditions.

Table 2: Average bit rate using Mpeg-2 on a 6 MHz channel.

	HDTV at 1080p	HDTV at 720p	SDTV at 480i	Datacasting (Mbps)
	18Mbps	13Mbps	4Mbps	
Scenario 1	1	0	0	1,3
Scenario 2	0	1	0	6,3
Scenario 3	0	0	1	15,3
Scenario 4	0	1	1	2,3

According to the configuration used on the encoder and multiplexer, different quality of service can be available as shown in table 2.

3 PERSONALCASTING

Personalization on datacasting, has the objective of sending personalized content to a particular user or group of users, required by the user or an agent, searching for direct communication with the spectator. Unlike the personalization of programming, addressed by many authors (Maybury et al., 2002) (Bove, 1985), Personalcasting in this proposal deals with the personalization of content sent through the data source. This concept is not limited to models used

by users in order to have direct access to broadcasting TV. It focuses on demonstrating the interactive and personalization content, and there is no need for a return channel with the broadcasting concessionaire.

Figure 1 shows the diagram of the Personalcasting model proposed, which is divided in four categories:

- User: Spectator using a mobile or stationary device.
- Society: Government bodies, advertising agencies, businesses, groups of people, professional corporations, etc. It will be responsible for user-broadcaster interaction, but not in real-time.
- Broadcasting TV: TV broadcaster with the right to provide the digital signal.
- Telecoms: Telecommunication service concessionaire companies. They will be responsible for real-time connection between the user and the TV broadcaster.

In Personalcasting, all data will be transmitted simultaneously to the population, but only the hardware containing a given key will be able to access its corresponding user contents. This "key" can be programmed in a language such as Java, NCL or Lua, or incorporated to the middleware using the MAC address or a Global Position System (GPS). The different stages shown in Figure 1 can be summarized as follows:

1. The user searches a particular information
2. The request for that information is performed according to the existing technological availability:
   a. Without a return channel – The request is previously performed by subscription to a service or by database registration. Example: Registration at websites, stores or public services.
   b. Intermittent communication - The request is made with limited data access and is only made available when necessary. Example: GPRS, SMS, phone line, etc.
   c. Permannent communication – The request is made through broadband, however, it can be received through Broadcasting or even through another broadband existing service. Example: ADSL, WIMAX, 3G, etc.
3. Analysis of the required content
4. Content search
5. Compacting of information to be sent
6. User identification
7. Transmission to the user
8. Reception of broadcast signal
9. User identification
10. Storage of personalized content
11. Notification when the user receives the desired content
12. Visualization of the content

The nature and quantity of different personalized contents that can be quantified to a specific audience, depends on the available bandwidth used by the video signal and the bit rate that can be allocated for the transfer of data. Table 3 shows an example of how contents can be delivered according to the scenarios proposed in Table 2, using specific bit rates.

Table 3: Quantity of different personalized contents.

	0,1 Kbps	**0,5 Kbps**	**1 Kbps**	**5 Kbps**
Scenario 1	153.000	30.600	15.300	3.060
Scenario 2	63.000	12.600	6.300	1.260
Scenario 3	23.000	4.600	2.300	460
Scenario 4	13.000	2.600	1.300	260

These values show that we can have a considerable amount of content that can be delivered to users with this system. The maximum personalized content, i.e. individualized, may be difficult to reach in cities with large populations due to bandwidth constrainsts. However, this can be an interesting solution for other geographical areas and it can be costumized by interest groups such as families or others.

A large variety of social and commercial applications can be made available. Below is a list containing a few examples of such applications:

- Personalized notifications
- Pre-scheduled service reminders
- Service subscriptions
- Pre-scheduled contents
- Personalized publicity
- Residence personalized contents
- T-learning
- T-Banking
- T-commerce
- Chat (through SMS or broadband)
- Digital Signage distribution
- Emergency Information distribution

A great advantage of this service is that many of its applications do not require a return channel to the

DTT concessionaire, the interactivity exists regardless to the levels. The number os services providing more personalized content increase as more bandwidth is made available for this datacasting service.

Since this is a relatively new concept, there are a number of topics requiring research and development, such as user identification methods, data encryption for security, appropriate graphical interface for the user, content creation and content adaptability, among others.

4 CONCLUSIONS

In this paper we have presented the concept of Personalcasting, which can be a great opportunity for DTT, following the migration from analog TV. The proposed system allows the access to personalized digital content for normal TV users or groups of users in a given geographical area. These contents can serve as the basis for the sustainability of the band connection, providing a better use of the spectrum available to TV broadcasts.

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