Interactive Digital Television

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BACKGROUND

Interactive television (iTV) can be defined as the result of the process of convergence between television and the new interactive digital technologies (Pagani, 2000, 2003).

Interactive television is basically domestic television boosted by interactive functions that are usually supplied through a back channel. The distinctive feature of interactive television is the possibility that the new digital technologies can give the user the ability to interact with the content that is on offer (Flew, 2002; Owe, 1999; Pagani, 2000, 2003).

The evolution toward interactive television has not just an exclusively technological, but also a profound impact on the whole economic system of digital broadcaster—from offer types to consumption modes, and from technological and productive structures to business models.

This article attempts to analyze how the addition of interactivity to television brings fundamental changes to the broadcasting industry.

This article first defines interactive transmission systems and classifies the different services offered according to the level of interactivity determined by two fundamental factors such as response time and return channel band.

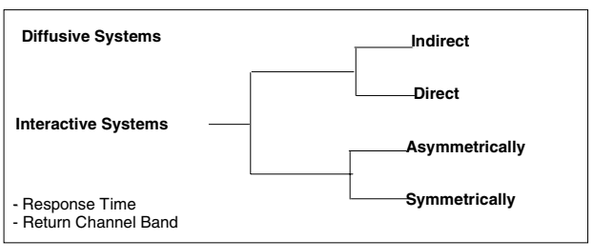
After defining the conceptual framework and the technological dimension of the phenomenon, the article analyzes the new types of interactive services offered.

The Interactive Digital Television (iDTV) value chain will be discussed to give an understanding of the different business elements involved.

A DEFINITION OF INTERACTIVITY

The term *interactivity* is usually taken to mean the chance for interactive communication among subjects (Pagani, 2003). Technically, interactivity implies the presence of a return channel in the communication system, going from the user to the source of information. The channel is a vehicle for the data bytes that represent the choices or reactions of the user (input).

Table 1. The classification of communication systems



This definition classifies systems according to whether they are diffusive or interactive (Table 1).

- Diffusive systems are those that only have one channel that runs from the information source to the user (this is known as *downstream*);
- Interactive systems have a return channel from the user to the information source (this is known as *upstream*).

There are two fundamental factors determining performance in terms of system interactivity: response time and return channel band.

The more rapidly a system's response time to the user's actions, the greater is the system's interactivity. Systems thus can be classified into:

- *Indirect interactive systems* when the response time generates an appreciable lag from the user's viewpoint;
- *Direct interactive systems* when the response time is either very short (a matter of a few seconds) or is imperceptible (real-time).

The nature of the interaction is determined by the bit-rate that is available in the return channel. This can

allow for the transfer of simple impulses (yes—no logic), or it can be the vehicle for complex multimedia information (i.e., in the case of videoconferencing). From this point of view, systems can be defined as asymmetrically interactive when the flow of information is predominantly downstream. They also can be defined as symmetrical when the flow of information is equally distributed in the two directions (Huffman, 2002).

Based on the classification of transmission systems above previously, multimedia services can be classified into diffusive (analog or digital) and interactive (Table 2).

Digital television can provide diffusive numerical services and asymmetrical interactive video services. Services such as videoconferencing, telework, and telemedicine, which are within the symmetrical interactive video based upon the above classification, are not part of the digital television offers.

Local Interactivity

An interactive application that is based on local interactivity is commonly indicated as «enhanced TV» application. It does not require a return-path back to the service provider.

An example is the broadcaster transmitting a football match using a «multi-camera angle» feature, transmitting the video signals from six match cameras simultaneously in adjacent channels. This allows the viewer to watch the match from a succession of different vantage points, personalizing the experience. One or more of the channels can be broadcast within a time delay for instant replays.

This application involves no signal being sent back to the broadcaster to obtain the extra data. The viewer is simply dipping in and out of that datastream to pick up supplemental information as required.

One-Way Interactivity

One-way interactivity refers to all interactive applications in which the viewer did send back a signal to the service provider via a return path, but there is no ongoing, continuous, two-way, real-time dialogue, and the user doesn't receive a personalized response.

The most obvious application is direct response advertising. The viewer clicks on an icon during a TV commercial (if interested in the product), which sends a capsule of information containing the viewer's details to the advertiser, allowing a brochure or sample to be delivered to the viewer's home.

Two-Way Interactivity

Two-way interactivity is what the technological purist defines as «true» interactivity. The user sends data to a service provider or other user, which travels along a return path, and the service provider or user sends data back, either via the return path itself or «over the air». Two-way interactivity presupposes

Table 2. Classes of service (classes not directly relevant to interactive multimedia services are in grey)

Class of services	Services (examples)
1. DIFFUSIVE SERVICES	
Analogue transmission	Free channels, Pay TV
Numerical diffusion	Digital channels Pay Per View (PPV) Near Video On Demand (NVOD)
2. INTERACTIVE SERVICES	
Asymmetric interactive video	Video On Demand (VOD), Music On Demand, TV Shopping, Interactive advertising Interactive games, TV banking
Low speed data	Telephony (POTS), data at 14,4; 28,8; 64; 128 Kbit/s
Symmetric interactive video	Co-operative work, Tele-work, Tele-medicine, Videoconference, Multi-videoconference
High speed data	Virtual reality, distribution of real time applications