

REPORT 1225

DATA BROADCASTING SYSTEMS AND SERVICES
IN AN HDTV ENVIRONMENT

(1990)

1. Introduction

The broadcasting of services using new television systems described in CCIR Recommendation 650 and of HDTV systems described in CCIR Report 1075 will encourage the build-up of a receiver base of high resolution and wide aspect ratio display equipment. Such equipment will offer an attractive prospect for the enhancement of existing data broadcasting services such as teletext, and for the development of entirely new services.

CCIR Recommendation 653 provides information about teletext systems developed for use with television systems of CCIR Recommendation 470 i.e. with NTSC, SECAM and PAL. This report is intended to be the basis on which a new draft recommendation, appropriate to the data broadcasting systems associated with the TV systems of Recommendation 650 and the HDTV systems of Report 1075, will be prepared during the study period 1990-1994.

The transition from conventional television to HDTV will offer the possibility of developing data broadcasting within a balanced distribution of maintaining compatibility between existing and new services. The introduction of HDTV services opens new possibilities for the broadcasting of data and accelerates the evolution of present teletext services towards the use of more sophisticated presentation features (e.g. DRCS, geometric, photographic, etc.) and completely new applications.

High resolution and wide aspect ratio displays make attractive the introduction of a variety of new teletext display formats, from computer-like 80 Latin alphabet characters per row, through to studio quality caption generator font styles and colour palette options.

Development of data broadcasting also acts in favour of the existing trend towards the integration at the technical and service levels between interactive and broadcast digital networks. In this process it is extremely important to maintain close cooperation with the CMTT, the appropriate CCITT Study Groups, the IEC and the ISO.

Emissions in digital format in an HDTV environment include integral parts of the programme such as sound and digital television components, primary programme related services such as subtitles and access control messages, and secondary digital components for non-TV-related services such as teletext, telesoftware and other data broadcasting services, which occupy capacity not used by the TV related services or freed by the removal of the TV service outside of broadcast hours.

At the present stage of development of HDTV in satellite broadcasting, two systems have been developed for use in the 12 GHz band i.e. MUSE and HD-MAC. Both systems require extensive signal processing to insert the HDTV signal into the relatively "narrow RF-band" channels (24 - 27 MHz). It is currently believed that not only will the channel bandwidth available in the 12 GHz band prevent the achievement of the full quality potential of the HDTV studio standard, but will also restrict the available capacity for data broadcasting services [CCIR, 1986-90a, b].

The CCIR has therefore envisaged the need for a further BSS band carrying HDTV in "wide RF-band" channels and offering received picture quality approaching that of the studio originated standard (see CCIR Report 1075).

To this end the WARC-ORB(88) has identified the frequency range for world-wide allocation to HDTV from 12.7 to 23 GHz. Preliminary proposals for "wide RF-band" HDTV systems, which use both analogue FM and fully digital solutions, consume from about 54 to 105 MHz depending on the system. In developing these proposals the necessary capacity for sound and data services must be adequately taken into account. The best prospect of achieving this is likely to be obtained from the fully digital approach to "wide RF-band" HDTV.

2. Harmonized evolution of sound and data services accompanying HDTV

There is a need to plan and provide adequate capacity and management flexibility for all digit components of HDTV emissions. Capacity for digital services may be located in the vertical blanking interval (VBI) or the horizontal blanking interval (HBI) of television systems which have an analogue vision part or in the multiplex of a wholly digital television system.

2.1 Integral digital components of the television service

2.1.1 Sound

All proposed HDTV transmissions make use of digital sound coding. In general the sound is likely to occupy a major proportion of the available capacity of the sound and data multiplex which could carry data broadcasting services depending on service requirements. These signals are described in Report 1075.

2.1.2 DATV

The use of DATV (digitally-assisted television) has been introduced in the HD-MAC system to improve the effectiveness of motion compensation techniques. It requires a capacity of 1.1 Mbit/sec which can be carried in the VBI, leaving in the VBI, only two lines in each field available for data broadcasting services. Wider RF-band HDTV emission systems should allow for more data capacity. DATV signals are described by [Storey, 1986] and discussed in Report 801, Part 7.

2.2 Digital services directly related to the programme

2.2.1 Subtitling

Subtitles [CCIR, 1986-90c] help viewers to follow television programmes in foreign languages. The alternative approach of sound dubbing is not only more expensive but risks the loss of much of the "atmosphere" of the artistic rendition included naturally in the original sound.

"Open" subtitles (permanently in the picture) may impair the visual quality of the television picture. Therefore the use of "closed" subtitling using data broadcasting giving the viewer the choice whether he should have subtitles or not is attractive especially in HDTV when the overall subjective response to the picture is particularly important.

The high picture quality of HDTV should be matched by a corresponding high visual quality of the subtitles. Compared with present subtitling features, the following improvements have been identified:

- smoother character fonts with proportional spacing;
- alternative fonts as well as larger character repertoires;
- enhanced colour features, such as variable saturation;
- smoother insertion into the picture;
- accuracy of timing of subtitle appearance (especially where several language subtitles are broadcast) of the positioning in the picture;
- separation of distinct parts of the subtitle service, e.g. in an interview situation, to distinguish between the speech and the name caption of the interviewed person.

The level of compatibility with present systems and services for subtitling requires study, in particular for HDTV systems which are compatible with standard TV systems.

Selection of subtitles and of the language variant, should follow a simple and standardized procedure.

Standards for the exchange of subtitles via different media should be established to avoid the need for costly reformatting.

2.2.2 *Controlled Access Messages*

Broadcasters are increasingly aware of the need for flexibility in the way they obtain revenue. Conditional access provides the means to control a mixture of advertiser supported, subscription and pay-per-view sources of revenue. This might allow the broadcaster to diversify his programming between advertisement supported and viewer supported programs.

Much effort has already been spent in the design of conditional access control systems. These systems were mainly developed for satellite delivery of scrambled services. The technology has reached a point where it is feasible to keep track of millions of subscribers at the transmit end with a reasonable size computer facility that allow channels, tiering and impulse pay-per-view to be controlled at each receiver containing a secure microprocessor.

2.2.3 *Management of channel data resource*

The time division multiplexed nature of HDTV transmission may follow a permanent structure or can be modified dynamically to suit the needs of the particular broadcast [CCIR, 1986-90a, d]. The control of such modification which must carefully synchronize the receiver with the transmission requires a data channel.