

1. INTRODUCTION

(1990)

The name "telesoftware" was first used at the time of the pioneering transmissions in the UK from Independent Television in 1977 to describe transmissions of coded data and computer programs.

Telesoftware is now one of the data broadcasting services recognized by the CCIR (Report 802-2) and it complies with the definition of the broadcasting service as given in Article 36 of the Radio Regulation.

The activities described in this Report relate to the following definition of "telesoftware": the provision, via telecommunications or broadcast networks, of software and associated data files intended to be acquired and then executed or used by terminals subject, when appropriate, to certain conditions governing access and payment.

Section 2 of this Report presents a survey of existing operational or experimental telesoftware services within broadcasting organizations. Section 3 summarizes the technical aspects of telesoftware. More detailed information about these technical aspects is given in the Annex. Section 4 identifies potential areas of standardization in the telesoftware domain.

2. TELESOFTWARE SERVICES WITHIN BROADCASTING ORGANIZATIONS

2.1 Current situation and future projects in the UK

2.1.1 Broadcast software by teletext (BBC)

The BBC Telesoftware Service was launched as a regular public service on 22 September 1983. It enjoys the same status as radio, television and teletext, although with lower priority and smaller budgets and audience. Three years after the launch, there were about 12 000 teletext adaptors for the BBC microcomputer in use, the only generally available method of receiving telesoftware by teletext.

The BBC Telesoftware Service is a part of the teletext service (Ceefax) under the control of the Manager, teletext. The day-to-day editorial control of the telesoftware output is with the Telesoftware Editor, who is also responsible for the commissioning and control of software for transmission. Rigorous standards are applied to ensure that the software performs as expected even in the hands of the inexperienced user.

The BBC Telesoftware Service was initially part of the BBC Computer Literacy Project [BBC, 1983], and much of the first year's material has been based on educational and practical applications for schools, colleges and the home programmer. Software already broadcast, covers such diverse applications as creating a weather database and providing programming building blocks. As with teletext itself, there is strong, and generally favourable and constructive feedback from users of the service. The service is now commissioning a new generation of more sophisticated software of the type which depends on, and takes advantage of, regular updating of data by telesoftware or from the normal teletext pages.

As well as presenting software which stands alone, there are many instances of software directly intended to supplement broadcast programmes, particularly those of an educational, documentary or current affairs nature.

The BBC Telesoftware Service has initially been funded by hardware royalties and support from national educational bodies. It is currently provided free of charge once the necessary adaptor has been purchased.

The future offers the possibility of a greater data channel capacity, whether by full-field teletext, or cable or satellite, allowing faster access and larger databases. An encrypted conditional-access option within the telesoftware service would allow commercially valuable software to be broadcast to paying subscribers.

At present, almost the entire output of the BBC Telesoftware Service is intended for use on the BBC microcomputer, and the computer language and machine specific functions of that particular device are used. Undoubtedly, there will soon be a need to broadcast versions of programmes for other machines. This will entail extra cost and effort by the broadcaster and it will reduce the overall throughput of information as, in some way or other, the different versions will need to be time-shared on the same channel. Although different versions of the programmes will be needed, a common data transmission format to support all versions should be possible.

2.1.2 Broadcast software by teletext (UK Independent Broadcasting)

A recent development in the UK is the transmission of telesoftware on Independent Television's Channel 4 as part of the "4-tel" teletext service. The telesoftware is broadcast in connection with a television programme series "4-computer buffs". An interim protocol has been defined and has been published. A Channel 4 teletext adaptor is available and this facilitates the loading of the telesoftware into the user's personal computer. Initial transmissions are aimed at the Sinclair Spectrum personal computer, but it is hoped to broadcast telesoftware for other personal computers later.

2.1.3 Broadcast software by radio (BBC)

In January 1984, the BBC began to broadcast software by radio using the BASICODE standard [NOS, 1984] - see also Section 2.3.1 - as short inserts in a weekly computer programme called "The Chip Shop" together with separately-scheduled late evening transmissions of about 40 s duration on four nights each week, using the v.h.f. and l.f. UK Radio 4 network. The information pack and an audio cassette of interpretation programmes were distributed by Broadcasting Support Services, about 20,000 sets were delivered as a result of the ten-week first series of the radio programme.

Subsequently the BBC acquired the UK distribution rights for the BASICODE 2 information and interpretation programmes, and this standard was used during the second series of "The Chip Shop" later in 1984 when more than 4000 sets of an improved cassette and bookset were distributed. This time the software transmissions were scheduled for early morning, which was operationally more convenient and which also found favour with the audience. The m.f. Radio 1 network was used and there were many difficulties in making useful recordings of software. Because of this, all of the software was subsequently repeated as a single block lasting 20 minutes using a v.h.f. network late at night.

Comparatively little cost and effort is required by the user to be equipped for receiving BASICODE 2 transmissions, and it was made clear that a continuing service was not being offered by the BBC. Users are, of course, also able to receive BASICODE 2 transmissions from commercial and foreign broadcasters.

It is likely that future transmissions of software by radio will use BASICODE 2 and that they will be related to specific radio programmes. As the language is necessarily a "highest common factor" of the functions offered by a large number of different machines, it is in some respects very limited, in particular in terms of graphic display and input/output facilities. So the technique offers wide coverage at low cost to distribute rudimentary programmes. It is an ideal method of servicing a "club" of BASICODE 2 enthusiasts who wish to offer their own programmes for transmission, indeed there is considerable exchange of material in this standard on the Radio Amateur and Citizens Band channels already. But a radio software service is always competing with conventional radio programmes, and the shock caused to a casual listener when unexpectedly assailed by a high-level mid-band audio tone must not be overlooked.

2.1.4 Other transmission channels

Software is, of course, regularly marketed and distributed on audio cassettes and floppy discs, and in printed form as listings and bar-codes. The BBC already publishes software in these forms and a broadcast software service relates to these in much the same way as teletext relates to the printed words. The broadcast service provides immediate delivery with nation-wide coverage at very low cost, whereas the use of a physical transmission medium allows large quantities of information to be delivered to known recipients in return for payment. The BBC Telesoftware Service is regularly used to provide reviews and examples of commercially published software, and it can also be used to update and even to correct published software.

Software is also distributed by viewdata (videotex) systems in the UK. This offers the prospect of rapid delivery with a simple method of recovering payment, but the capital cost of establishing a source and the costs of the telephone connection and computer time have to be considered.

Alternative digital broadcasting channels may have capacity available for the transmission of software, such as the radio-data system (EBU, 1984), the proposed DBS sound/data packet multiplex system (Report 1073) and a proposed digital stereo sound system for television.

2.2 Current situation and future projects in France

Experimental chains for the production and coding, broadcast or point-to-point distribution, reception and execution of software have been built and tested. The different aspects are detailed below:

2.2.1 Production

In the case of existing software or data files, the problem of production does not arise and the telesoftware service is reduced to a transport service. Several applications of this type have been tried in television broadcast networks and they should lead to operational services in the near future:

- broadcast transmission of software to microcomputers used in the National Education Service
- broadcast transmission of "black lists" (for example, numbers of stolen credit cards).

In contrast, when the application is created specifically for the telesoftware service, it can be enriched by introducing into an existing language a range of additional primitives serving, for example, to allow access to the teletext display module or the data acquisition module. A project of this kind has been effected in PASCAL USCD (the transmitted code being P - code resulting from the compilation) and similar work is under way in BASIC.

2.2.2 Coding

The problem of coding arises when the software is transmitted within the services or infrastructure provided for videography. In other cases, and for data file transmission in particular, the network is transparent and no pre-coding is needed.

Where videography services are involved, the first coding technique to be used was to divide each byte into two hexadecimal-coded ASCII numbers. The technique used now is the "3 in 4" method defined by the CEPT.

2.2.3 Transport

a) On television broadcast networks:

When data files are transmitted the transport protocol used is DIDON 3 (involving data groups, error-detection and systematic repetition).

In the context of teletext (D2-A4 standard) the coded data described in the previous section are transported in sub-articles protected by a CRC 16. These sub-articles are grouped in articles with a dual liaison byte. Correction is achieved by exploiting the inherent repetition in cyclic transmission.

b) On telecommunications networks:

The videotex network provides a synchronous transport service for words of 7 bits + parity, with an error-correction procedure operating in block mode.

2.2.4 Reception

In videographic services (broadcast or interactive) reception is done by the circuits of the videography terminal. Additional error-correction processing is necessary in broadcast services.

For data file transmission services, use is made of special equipment called "DIDEM" (by analogy with "modem"). This equipment takes the form of an autonomous "black box" or a microcomputer card.

2.2.5 Utilisation

In data file services the execution is done by a terminal (microcomputer or specialized terminal) which takes data from the DIDE.

When an extended language is used, the terminal must incorporate facilities for executing this language. A P - code interpreter has been written for a teletext terminal with extended memory.

Experiments with broadcast software have been done using A2-Antiope.

2.3 Situation in the Netherlands (NOS)

2.3.1 Broadcast software by radio

The Dutch domestic radio programme "Hobbyscoop" broadcast by NOS transmitted its first computer programme in 1978, and it soon became a regular feature of their weekly programme. The programme was heard throughout the Netherlands on FM (VHF) and medium wave, on the Hilversum 2 and 4 networks.

Four different computers were supported in turn, each having a monthly service. Subsequently a common language and transmission format were established under the name BASICODE, and an improved version known as BASICODE 2 [NOS, 1984] has been in regular on-air use since the start of 1983. Some computers require minor modification to accept the signals, and most require a programme to be loaded first in order to interpret BASICODE 2.

Since the medium-wave signal of Hilversum 2 was reaching outside the Dutch borders, letters came from computer enthusiasts in the UK, Germany, Belgium and Denmark asking for more information. Further international interest was obtained when the Dutch external service, Radio Netherlands, which broadcasts worldwide on short wave, took interest in BASICODE. For the time being, a 15-minute English language programme called "Media Network" is sent out to radio stations worldwide, which rebroadcast the programme for their local listening areas. It can be heard on stations in Australia, USA, Canada, Sweden, England, parts of Africa and Asia, and Islands in the Pacific Ocean.

The use of a system as BASICODE requires constant updating in order to cope with new computers.

2.3.2 Broadcast software by teletext

Up till now, no regular transmission of telesoftware via teletext has taken place. Only during an exhibition in September 1984, NOS gave a demonstration of downloading software for home computers, using teletext as a transmission channel.

2.4 Situation in Italy (RAI)

A pre-operational telesoftware service has started on the first and second television networks.

A unified system for broadcasting software on sound channels, called RAI-Radiosoftware, has been specified and is now in operation on the third FM radio network.