



User Requirements for Terrestrial Digital Broadcasting Services

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0. Introduction

0.1 Terrestrial digital broadcasting services offer possibilities for :

- a wide range of service options ranging from LDTV to HDTV
- improved reception quality, also for portable reception
- the flexibility to reconfigure the available data capacity between different service options (exchange between quality and quantity, with related cost consequences)
- HDTV services, when cost effective and convenient large screen displays become available for the consumer.
- new services

0.2 One of the benefits of terrestrial digital television is a more efficient frequency usage, that can only be attained through discontinuation of present analogue services after an appropriate transition period. Care should be taken that the terrestrial digital system may be operated in all participant countries without mutual interference.

0.3 To achieve this benefit, positive steps should be taken to facilitate consumer migration from analogue to digital and to keep the transition period as short as possible. Such steps include :

- an attractive programme offer including simulcasting of present analogue services, plus new services aimed at the largest possible audience, including specific service features which cable and satellite transmission will not be able to offer, such as portable reception.
- early and massive introduction of suitable digital receivers.
- the establishment of a single European DVB terrestrial standard.

0.4 It is recognised that different starting conditions in individual countries (e.g. number of existing analogue services, spectrum availability...) may lead to different introduction scenarios in individual markets. The system should therefore allow for varying needs.

0.5 It is planned to start services no later than the end of 1997. This implies that a draft specification for a baseline system should be completed before the end of 1994. An ETSI standard should be approved before the end of

1995. It is recognised, however, that systems tests may not be completed before early 1995.

- 0.6 In the remainder of this document the following convention has been used to distinguish between three types of future option:-

This typeface indicates a future option requiring backwards compatibility

This typeface indicates a future option which may require backwards compatibility.

This typeface indicates a future option not requiring backwards compatibility

1. **Data containers**

It should be possible to consider the total transmission capacity as a "data container" that may contain, depending on the Service Provider's needs, a set of different kinds of services being transmitted simultaneously.

2. **Video Quality in normal receiving conditions¹**

The Video Quality of terrestrial Digital TV Services will be determined by the broadcasters within the range from at least VHS-like quality (LDTV) to somewhat better than standard quality (EDTV).

The service should be extensible to HDTV quality.

The service should support 4:3 and 16:9 picture format including status identification and the use of dynamic pan vectors.

Notes :

- a) VHS-like quality might be useful when there is a shortage of frequencies.
- b) Standard Quality means at least PAL/SECAM quality, free from degradations inherent in analogue transmission.

¹ as defined in Section 4

- c) Some broadcasters may wish to achieve around Studio Quality (as defined by CCIR Rec 601), which is supported by MPEG-2 MP@ML

3. Audio quality in normal receiving conditions²

- 3.1 The technical implementation of the audio coding should have the baseline quality of MPEG 2 in conformance with the satellite and cable specification.

3.1.1/ EDTV service characteristics

5 channels with a subjective quality comparable with CD (which could be used for surround sound), plus additional services (such as low frequency enhancement channel, Hard-of-Hearing channel, additional control data) and 6 commentary channels.

3.1.2/ SDTV service characteristics

One stereo service with a subjective quality at least comparable with NICAM 728, plus 3 commentary channels (or alternatively, a second language service).

3.1.3/ LDTV service characteristics

One stereo service with a subjective quality at least comparable with NICAM 728.

Notes:

- a) audio service characteristics as defined above in 3.1.1 for EDTV would also be suitable for HDTV services.
- b) a "commentary channel" is assumed to have a bit-rate of 64 kbit/s.

- 3.2 Due to the complexities of television programme production techniques, the maximum subjectively acceptable audio-video delay is usually reached before applying the signals to the transmission chain. It is therefore important that the digital transmission process does not worsen a situation which is already at a subjective limit. In order to provide some small degree of latitude for implementation, a design limit of ± 5 ms should be used.

² as defined in Section 4

4. Receiving Conditions

The system should be designed for stationary reception as well as static portable reception. The coverage area for stationary reception is likely to be larger than for portable reception.

To the extent that HDTV services are feasible, the system should be designed for at least stationary reception of such services. Static portable reception also of HDTV services might be possible with certain restrictions.

Consideration could be given to the development of a system for the mobile reception of services (to the extent it is feasible).

5. Receiver/decoder Features

- a) IRDs should include a data output port. This is to reflect that digital video broadcasting is more than just a set of traditional TV channels but also a tool for broadcasters and service providers to build new services.
- b) IRDs should be optionally capable of decoding additional services, including teletext, in addition to the main TV service (e.g. a second set of video, audio and data for connection to a VCR, PC or printer...).
- c) Ideally, IRDs should include a modem for connection to a public telephone network for access control, billing or downloading new encryption algorithms, interactive services etc.
- d) IRDs should be able to respond appropriately to transmitted VCR-dedicated information, e.g. PDC control information, etc.
- e) A user-friendly indicator based on the scanning of one or more meaningful parameters (field strength, bit error rate...) should help the viewer to identify variations of local reception conditions. In the case of service interruption, due to local and/or temporary variations in reception conditions, consideration should be given to allowing the receiver to indicate to the viewer that the service is temporarily interrupted but that the receiver is still working and is receiving a signal. Such information could be acquired, for instance, from the demodulator synchronisation process, which should be much more rugged than the received data itself.
- f) The additional cost to the viewer (on the basis of a conventional analogue package) of equipment necessary to access digital services should be less than 450 ECUs at the time of introduction. Within two years of introduction,

the retail price difference between a digital TV set and the corresponding analogue set should be less than 200 ECUs.

6. Network

- a) The service should be optimised using existing transmitter sites which, wherever possible, will allow immediate reception with existing antennas.
- b) The system should permit maximum use of the flexibility in spectrum planning provided by digital broadcasting.
- c) The system should be designed to allow operation of single frequency networks.
- d) The system should be designed so that single frequency relays (gap-fillers) can already be used in the introduction phase.
- e) The system should provide for local and national coverage under acceptable economical and frequency management conditions.
- f) The system should be designed for adequate ruggedness against interference from analogue TV and other interference sources, so that digital TV services can be introduced in all existing channels (including taboo channels). It must minimize its own interference into existing terrestrial analogue services.

7. Flexibility of the system

considering :

- the large differences in frequency planning conditions between different countries,
- the large differences in priorities between operators regarding capacity (number of channels and quality) and coverage,
- the large differences in receiving conditions between stationary reception and portable reception,

The system should be reconfigurable in such a way that the broadcaster may trade capacity against coverage and within a given capacity define which services are to be received, at a given quality level³, with stationary, and static portable reception, respectively.

³There may be a future requirement for limited quality services to use lower bandwidth channels e.g. 2MHz. The TCM requests the TM's views on the implications of this on complexity and compatibility with 8 MHz systems.

In the first phase, a non-hierarchical system would be acceptable. **In the second phase, from a commercial point of view, a two-layer hierarchical system is judged to be sufficient.⁴ In this second phase, it is a requirement that the first phase receivers are able to receive the lower layer of the hierarchical signal.**

8. Commonality with satellite and cable

The terrestrial system should provide maximum commonality with other transmission media (satellite, cable) to minimize development and receiver costs. Easy conversion from satellite to terrestrial should be possible with minimum processing. The same source coding and multiplexing as for satellite and cable should be used.

Retransmission of terrestrial programmes on cable or (S)MATV should be as transparent and simple as possible.

9. Service Information

Random access to programmes should be possible, via Service Information, and the service acquisition time for all services should be as small as possible (typical target less than 0.5 seconds and certainly not more than 1 second).

Service Information should be transmitted to facilitate user-friendly programme selection and system operation (it is yet to be determined if any particular SI is specifically needed for terrestrial).

The system should include information about which programmes are transmitted so as to provide a form of TV guide.

⁴The views of the TM are sought to assist the TCM to refine its views on hierarchical systems.

10. Conditional Access Services

The system must allow the operation of both clear and conditional access services (whether standardised or not). It should be possible to apply conditional access to each individual service component.

It should be possible to scramble an individual data stream at any convenient point in the transmission chain.

Harmonisation with conditional access systems in use on other transmission media is highly desirable.

11. Teletext

Teletext (of the type often known as WST or CCIR system B) is required.