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| **Recommendation ITU-R BT.1301-1**  **(03/2011)** |
| **Data services in digital television**  **broadcasting** |
| **BT Series**  **Broadcasting service**  **(television)** |

Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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| Series of ITU-R Recommendations  (Also available online at <http://www.itu.int/publ/R-REC/en>) | |
| **Series** | Title |
| **BO** | Satellite delivery |
| **BR** | Recording for production, archival and play-out; film for television |
| **BS** | Broadcasting service (sound) |
| BT | Broadcasting service (television) |
| **F** | Fixed service |
| **M** | Mobile, radiodetermination, amateur and related satellite services |
| **P** | Radiowave propagation |
| **RA** | Radio astronomy |
| **RS** | Remote sensing systems |
| **S** | Fixed-satellite service |
| **SA** | Space applications and meteorology |
| **SF** | Frequency sharing and coordination between fixed-satellite and fixed service systems |
| **SM** | Spectrum management |
| **SNG** | Satellite news gathering |
| **TF** | Time signals and frequency standards emissions |
| **V** | Vocabulary and related subjects |

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| ***Note***: *This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.* |

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RECOMMENDATION ITU-R BT.1301-1

Data services in digital television broadcasting

(Question ITU-R 45-2/6)

(1997-2011)

Scope

This Recommendation specifies data services to be used for digital television broadcasting.

The ITU Radiocommunication Assembly,

considering

a) that digital television broadcasting has been introduced in many countries around the world;

b) that an efficient service identification mechanism is essential due to the flexible and complex nature of the service;

c) that conventional television broadcasting systems already provide means to convey ancillary data;

d) that subtitling is an important service in an increasing number of countries;

e) that various multimedia services in other media is expected to stimulate the interest for a broadcast multimedia service;

f) that such a service may give broadcasters opportunities to provide completely new services as well as promoting existing services;

g) that commonality of identification of different data services is desirable,

recommends

**1** that if digital television broadcasting systems include data services, these services should conform to one or more of the following:

– ancillary data based on the specifications defined in Annex 1;

– subtitling based on the specifications defined as specified in Annex 2;

– broadcast multimedia services based on the specifications defined in Annex 3,

**2** that compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (e.g. to ensure interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words “shall” or some other obligatory language such as “must” and the negative equivalents are used to express requirements. The use of such words shall in no way be construed to imply partial or total compliance with this Recommendation.

Annex 1  
  
Teletext

If a digital television broadcasting service includes an existing teletext system (conforming to Recommendation ITU‑R BT.653) then it should be in accordance with the specification described in this Annex.

# 1 Introduction

This Annex specifies the method by which teletext, in accordance with Recommendation ITU‑R BT.653, may be carried in digital video broadcasting bit streams. This transport mechanism is intended to satisfy the following requirements:

– to support, if required, the transcoding of the teletext data into the vertical blanking interval (VBI) of analogue video;

– the transcoded signal should be compatible with existing TV receivers with teletext decoders;

– the transmission mechanism should be capable of transmitting subtitles with accurate timing with respect to the video (i.e. to within or near the frame accuracy).

A more general data transport mechanism for conveying new types of data services is outside the scope of this Annex, but the transport syntax specified here can also be adapted for other data.

# 2 Definitions and abbreviations

## 2.1 Definitions

For the purposes of this Annex, the following definitions apply:

*MPEG-2 Transport Multiplex:*Refers to the International Organization for Standardization/International Electrotechnical Commission Standard 13818 (ISO/IEC Standard 13818). Systems coding is defined in Part 1.

*Section:*  A section is a syntactic structure used for mapping all service information defined in Recommendation ITU‑R BT.1300 – Service multiplex, transport and identification methods for digital terrestrial television broadcasting; into ISO/IEC Standard 13818 transport stream packets.

*Service:*  A sequence of programmes under the control of a broadcaster which can be broadcast as part of a schedule.

*Teletext descriptor:*  See Recommendation ITU-R BT.1300; it is used in the Programme Specific Information (PSI) Programme Map Table (PMT) to identify streams which carry teletext. The descriptor is located in a programme map section following the relevant ES\_info\_length field.

## 2.2 Abbreviations

For the purpose of this Annex, the following abbreviations apply:

MPEG: Moving Pictures Expert Group

PES: Packetized elementary stream

PID: Packet identifier

PTS: Presentation time stamp

# 3 Insertion of teletext into the MPEG-2 transport multiplex

As any video or audio data, teletext data are conveyed in PES packets which are carried by transport stream packets as defined in ISO/IEC Standard 13818‑1. The PID of a teletext stream associated with a service is identified in the PMT of the PSI for that service. The teletext data stream is given stream\_type value 0x06 (which indicates a PES stream carrying private data). The appropriate ES\_info field of the programme map section describing teletext data streams shall contain a teletext descriptor as defined in Recommendation ITU-R BT.1300 for service information in digital video broadcasting. A service may include more than one teletext data stream, provided that each stream has a different value of data\_identifier, and that the streams are distinguishable by their respective teletext descriptors in the PSI.

## 3.1 data\_field for ITU-R teletext systems

TABLE 1

Syntax for data\_field for ITU-R teletext systems

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ITU-R teletext system | | | | | | | |  |
|  | 50 Hz | | | | 60 Hz | | | |  |
|  | A | B | C | D | A | B | C | D |  |
| Syntax | No. of bits | | | | | | | | Identifier |
| data\_field(){ |  |  |  |  |  |  |  |  |  |
| reserved\_future\_use | 2 | 2 | 2 | 2 | – | 2 | 2 | 2 | Bslbf |
| field\_parity | 1 | 1 | 1 | 1 | – | 1 | 1 | 1 | Bslbf |
| line\_offset | 5 | 5 | 5 | 5 | – | 5 | 5 | 5 | Uimsbf |
| teletext\_data\_unit | 304 | 344 | 272 | 280 | – | 280 | 272 | 280 | Bslbf |
| stuffing\_bits | 40 | – | 72 | 64 | – | 64 | 72 | 64 | Bslbf |

### 3.1.1 Semantics for PES data field

data\_identifier: This 8-bit field identifies the type of data carried in the PES packet. It is coded as in Table 2.

TABLE 2

data\_identifier

|  |  |
| --- | --- |
| data\_identifier | Meaning |
| 0x00 to 0x0F | A Teletext/50 Hz |
| 0x10 to 0x1F | B Teletext/50 Hz |
| 0x20 to 0x2F | C Teletext/50 Hz |
| 0x30 to 0x3F | D Teletext/50 Hz |
| 0x40 to 0x4F | Reserved for future use |
| 0x50 to 0x5F | B Teletext/60 Hz |
| 0x60 to 0x6F | C Teletext/60 Hz |
| 0x70 to 0x7F | D Teletext/60 Hz |
| 0x80 to 0xFF | User defined |

The data\_identifier shall be set to the same value for each PES packet conveying data in the same teletext data stream.

data\_unit\_id: This 8-bit field identifies the type of data unit. It is coded as in Table 3.

TABLE 3

data\_unit\_id

|  |  |
| --- | --- |
| data\_unit\_id | Value |
| 0x00 to 0x01 | Reserved for future use |
| 0x02 | Teletext non-subtitle data |
| 0x03 | Teletext subtitle data |
| 0x04 to 0x7F | Reserved for future use |
| 0x80 to 0xFE | User defined |
| 0xFF | data\_unit for stuffing |

For streams identified in the PSI by the digital video broadcasting teletext descriptor (see Recommendation ITU‑R BT.1300), only values 0x02, 0x03 and 0xFF are permitted.

data\_unit\_length: This 8-bit field indicates the number of bytes in the data unit following the length field. For data units carrying ITU teletext data, this field shall always be set to 0x2C.

reserved\_future\_use: This field may be used in the future for defined extensions. As a default both reserved\_future\_use bits are set to “1”.

field\_parity: This 1-bit flag specifies the field for which the data is intended; the value “1” indicates the first field of a frame, the value “0” indicates the second field of a frame.

line\_offset: This 5-bit field specifies the line number on which the teletext data packet is intended to be presented if it is transcoded into the VBI. Within a field, the line\_offset numbering shall follow a progressive incremental order except for the undefined line\_offset value “0”. The toggling of the field\_parity flag indicates a new field.

The line\_offset is coded as in Table 4.

TABLE 4

line\_offset

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| line\_offset | Meaning | | Signification | |
|  | 50 Hz | | 60 Hz | |
|  | field\_parity  1 | field\_parity  0 | field\_parity  1 | field\_parity  0 |
| 0x00 | Line number undefined | | Line number undefined | |
| 0x01 to 0x05 | Reserved for future use | | Reserved for future use | |
| 0x06 | Line number  6 | Line number  319 | – | – |
| 0x07 | Line number  7 | Line number  320 | – | – |
| 0x08 | Line number  8 | Line number  321 | – | – |
| 0x09 | Line number  9 | Line number  322 | – | – |
| 0x0A | Line number  10 | Line number  323 | Line number  10 | Line number  273 |
| : | : | : | : | : |
| 0x13 | Line number  19 | Line number  332 | Line number  19 | Line number  282 |
| 0x14 | Line number  20 | Line number  333 | Line number  20 | Line number  283 |
| 0x15 | Line number  21 | Line number  334 | Line number  21 | Line number  284 |
| 0x16 | Line number  22 | Line number  335 | – | – |
| 0x17 to 0x1F | Reserved for future use | | Reserved for future use | |

Only values 0x00 and 0x06 to 0x16 are permitted for teletext data\_units in streams identified in the PSI by the digital video broadcasting teletext descriptor (see Recommendation ITU‑R BT.1300).

teletext\_data\_unit: These fields correspond to the bytes following the clock-run-in sequence of an ITU teletext system data unit as defined in Recommendation ITU-R BT.653. Teletext data packets are inserted in the same order as they are intended to arrive at the teletext decoder or to be transcoded into the VBI.

stuffing\_bits: The teletext\_data\_unit is followed by as many stuffing bits as are required to make the data\_field length equal to 352 bits long.

Appendix 1  
to Annex 1  
  
Teletext elementary stream



Annex 2  
  
Subtitling

There are a number of schemes for carrying closed caption information in MPEG-2 Transport as defined in Recommendation ITU-T H.262 ⎜ ISO/IEC 13818‑2 or Recommendation ITU-T H.222.0 ⎜ ISO/IEC 13818-1. Possibilities include:

– user data in MPEG video as defined in ATSC A/53 Part 4 (2‑1);

– private streams in MPEG systems as defined in ARIB STD-B24 (2‑2) and ETSI EN 300 472 (2‑3);

– a registered stream in MPEG systems using the registration descriptor.

References (informative)

(2-1) ATSC A/53 Part 4 (2007), ATSC Digital Television Standard Part 4 – MPEG-2 Video System Characteristics.

(2-2) ARIB STD-B24 V5.3 (2009-07), Data coding and transmission specification for digital broadcasting, Volume 1, Part 3 – Coding of caption and superimpose.

(2-3) ETSI EN 300 472 V1.3.1 (2003-05), Digital Video Broadcasting (DVB); Specification for conveying ITU-R System B Teletext in DVB bitstreams.

Annex 3  
  
Broadcast multimedia services

Application environments of broadcast multimedia services should be compliant to Recommendation ITU-T J.200. Content formats used for broadcast multimedia services should be compliant to Recommendations ITU-R BT.1699 and ITU‑R BT.1722.

Recommendation ITU-T J.200 defines application environment for digital interactive television services. This Recommendation defines basic architecture of the application environment and architecture of application engines called presentation engine and execution engine.

Recommendation ITU-R BT.1699 defines worldwide common core of content format for presentation engine. Similarly, Recommendation ITU-R BT.1722 defines worldwide common core of content format for execution engine.

References (normative)

(3-1) Recommendation ITU-T J.200, *Worldwide common core – Application environment for digital interactive television services.*

(3-2) Recommendation ITU-R BT.1699 – Harmonization of declarative application formats for interactive TV.

(3-3) Recommendation ITU-R BT.1722 – Harmonization of the instruction set for the execution engine for interactive TV applications.