

International Telecommunication Union

ITU-R
Radiocommunication Sector of ITU

Recommendation ITU-R BT.1301-1
(03/2011)

**Data services in digital television
broadcasting**

BT Series
Broadcasting service
(television)



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RA	Radio astronomy
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SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
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V	Vocabulary and related subjects

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								Identifier
	50 Hz				60 Hz				
	A	B	C	D	A	B	C	D	
Syntax	No. of bits								
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	

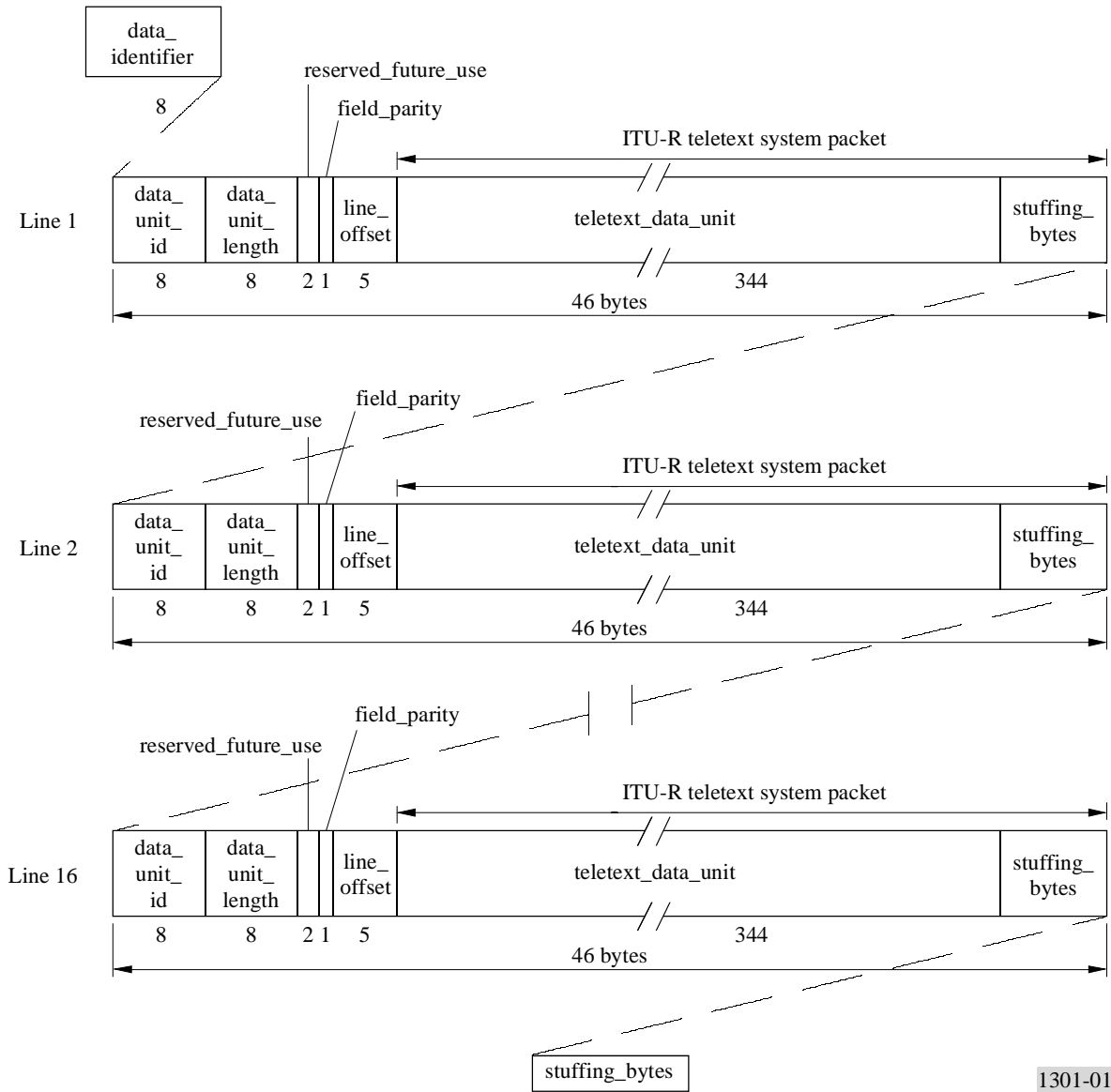
Only values 0x00 and 0x06 to 0x16 are permitted for teletext data_units in streams identified in the PSI by the digital video broadcasting teletext descriptor (see Recommendation ITU-R BT.1300).

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.
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