



GENEVA, 20-24 OCTOBER 1997

Ref.: Document 11/5

Radiocommunication Study Group 11

DRAFT NEW RECOMMENDATION ITU-R BT.[11-3/AC]

DATA SERVICES IN DIGITAL TERRESTRIAL TELEVISION BROADCASTING

(Question ITU-R 121/11)

The ITU Radiocommunication Assembly,

considering

- a) that digital terrestrial television broadcasting (DTTB) will be introduced in the VHF/UHF bands;
- 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 the present introduction of 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 DTTB 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.

Attention: This is not an ITU publication made available to the public, but **an internal ITU Document** intended only for use by the Member States of the ITU and by its Sector Members and their respective staff and collaborators in their ITU related work. It shall not be made available to, and used by, any other persons or entities without the prior written consent of the ITU.

ANNEX 1

Teletext

If a DTTB 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: Refers to the International Organization for Standardization/International Electrotechnical Commission Standard 13818 (ISO/IEC Standard 13818). Systems coding is defined in Part 1. Video coding is defined in Part 2. Audio coding is defined in Part 3.

Section: A section is a syntactic structure used for mapping all service information defined in a draft new Recommendation ITU-R BT.[11-3/XXE] (Document 11/48-11/1010) "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 draft new Recommendation ITU-R BT.[11-3/XXE] (Document 11/48-11/1010); it is used in the Program Specific Information (PSI) Program Map Table (PMT) to identify streams which carry teletext. The descriptor is located in a program map section following the relevant ES_info_length field.

2.2 Abbreviations

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

ITU-R: International Telecommunication Union - Radiocommunication Sector

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

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 program map section describing teletext data streams shall contain a teletext descriptor as defined in the draft new Recommendation ITU-R BT.[11-3/XXE] 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 draft new Recommendation ITU-R BT.[11-3/XXE], 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 | | Meaning | |
|--------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | 50 Hz | | 60 Hz | |
| | field_parity = 1 | field_parity = 0 | field_parity = 1 | field_parity = 0 |
| 0x00 | Line number undefined | Line number undefined | Line number undefined | Line number undefined |
| 0x01 to 0x05 | Reserved for future use | Reserved for future use | 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 | 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 draft new Recommendation ITU-R BT.[11-3/XXE]).

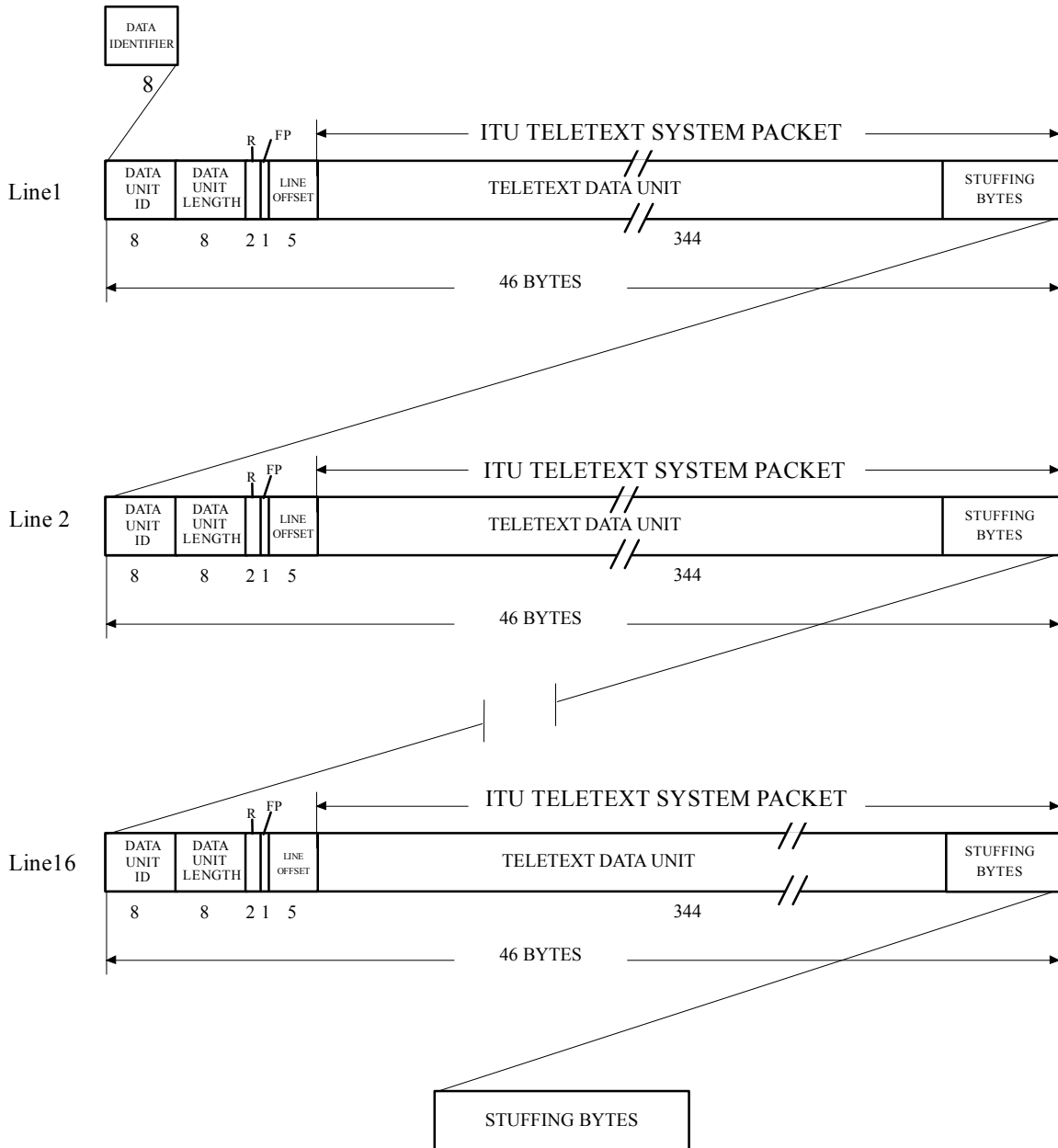
teletext_data_unit: These fields correspond to the bytes following the clock-run-in sequence of an ITU teletext system data unit as defined in Recommendation ITU-R BT.653. Teletext data packets are inserted in the same order as they are intended to arrive at the teletext decoder or to be transcoded into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

ISO/IEC JTC 1/SC 29/WG 11 was asked to advise on a preferred solution for defining closed caption capabilities for digital television.

They advised that there are a number of alternatives for carrying closed caption information. Possibilities include:

- user data in MPEG video,
- private streams in MPEG systems,
- a registered stream in MPEG systems using the registration descriptor.

MPEG was unable to offer a preferred solution and suggests that such choices be left to the users of the MPEG standard.

Both the Electronic Industries Association (EIA) (North America) and the DVB project (Europe) are conducting studies into provision of closed caption capability.

ANNEX 3

Broadcast multimedia services

Further studies are required.