International Telecommunication Union

ITU-R

Radiocommunication Sector of ITU

Recommendation ITU-R BT.653-3

(02/1998)

Teletext systems

BT Series

Broadcasting service (television)

Foreword

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Series	Title
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BR	Recording for production, archival and play-out; film for television
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M	Mobile, radiodetermination, amateur and related satellite services
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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.*

Electronic Publication
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RECOMMENDATION ITU-R BT.653-3*, **

Teletext systems***

(1986-1990-1994-1998)

The ITU Radiocommunication Assembly,

considering

a) that several countries have developed and established satisfactory teletext systems;

b) that it would be highly desirable to assure the compatibility of such systems with the videotex (interactive videography) systems;

c) that a proliferation of such systems would add further complication to the interconnection of such systems,

recommends

1 that for a country wishing to initiate a teletext service, one of the four systems in Annex 1 is to be preferred.

Annex 1

Characteristics of teletext systems

1 Introduction

This Annex provides information about the teletext systems, developed for use with television systems of Recommendation ITU-R BT.470.

An outline description of the essential elements of the teletext systems is given in Table 1 and the accompanying diagrams (Figs 6, 7, 8 and 9). The structure of the Table is based, as far as practicable, on the ISO reference model[1].

Table 2 lists the countries and systems used.

2 Definition of the teletext service

A digital data broadcasting service which may be transmitted either within the structure of an analogue television signal or by using digital modulation systems. The service is primarily intended to display text or pictorial material in two-dimensional form reconstructed from coded data on the screens of suitably equipped television receivers.

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* Radiocommunication Study Group 6 made editorial amendments to this Recommendation in 2002 in accordance with Resolution ITU-R 44.

** Radiocommunication Study Group 6 made editorial amendments to this Recommendation in October 2010 in accordance with Resolution ITU-R 1.

*** Also referred to as broadcast videography.

1 ISO/IEC 7498-1: 1994 “Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model”.

NOTE 1 – At the present time, the field-blanking interval is, in most cases, used for the data broadcasting service, but a possible option exists for extending the data broadcasting service to occupy all active lines in a television signal. The effect on protection ratios for television broadcasting has been studied for 625-line systems and the results published in Recommendation ITU-R BT.655.

3 A layered model for describing teletext systems

Teletext systems can be described, as shown in Fig. 1, according to the reference model for data broadcasting detailed in Recommendation ITU-R BT.807.

According to this functional model, services may be delivered by arranging the information into logical groupings, delivering them to lower layers for transmission and, after reception, reconstituting the information into the proper form for use by the recipient.

In what follows, the names of the layers are those adopted by the ISO in ISO 7498 (1984) "Basic reference model for open systems interconnection". Some of these names are used in broadcasting technology to express different concepts. This particularly applies to the terms "network" and "link" and care must be taken to avoid confusion.

Layer 1: Physical

Within a given broadcast transmission system this layer relates to the electrical transmission of the data signal and includes such items as bit rate and pulse shaping.

Layer 2: Link

This layer includes logical functions related to the data transmission such as digital frame synchronization techniques, data formatting and error control procedures.

Layer 3: Network

This layer includes logical functions related to multiplexing and demultiplexing of data packets belonging to different communication flows. Examples of such functions are data channel addressing and data packet sequencing.

Layer 4: Transport

This layer provides the function of arranging the data in a way suitable for transfer from one point to another, by such means as segmenting data into groups of information, delivering them to the lower layers for transmission to the distant point and there reconstituting the groups of information and arranging them in a proper sequence.

Layer 5: Session

This layer includes data handling functions which are intended to assist the user to gain access to services. Examples of such functions are access control and page classification.

Layer 6: Presentation

This layer comprises data presentation functions. Examples are the codings used for the presentation of text, pictures and sound.

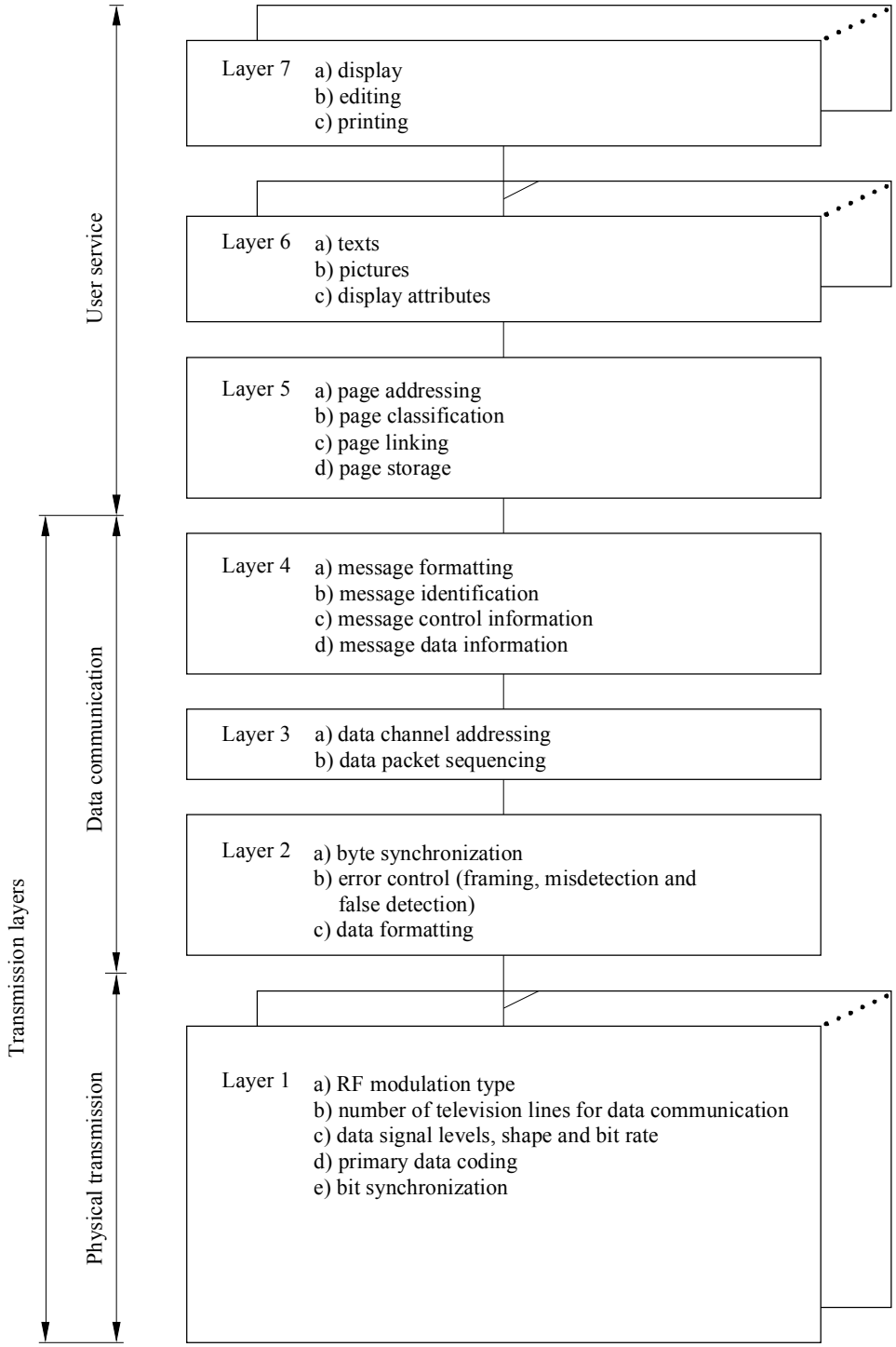
Layer 7: Application

This layer refers to practical use of the potential facilities provided by the lower layers for a given type of service.

Examples are captioning, telesoftware and cyclic teletext.

FIGURE 1

A functional layered model for the description of teletext systems



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4 Transmission characteristics

The logical structure of different elements of the teletext data and their relationship to the television signal are illustrated in Figs. 2, 3, 4 and 5.

4.1 **Data line** (see Fig. 2)

A data line is a television line, the active part of which is assigned to digital data. The data content is subdivided into a bit synchronization sequence followed by a *data unit*.

4.2 **Data unit** (see Fig. 3)

A data unit is a logical unit of data, sudivided into a byte synchronization sequence and a *data packet*.

4.3 **Data packet** (see Fig. 4)

A data packet is an identifiable information package which comprises:

- *a prefix* providing for functions such as addressing, packet size indication, packet continuity indication and designation of packet type;
- *a data block* containing control signals or user information;
- in some systems, a *suffix* to perform the function of error detection or correction at the packet level.

4.4 **Data group** (see Fig. 5)

A data group is an identifiable group of data blocks containing information from the same source.

5 Presentation layer characteristics

In specifying the presentation layer of teletext systems, substantive account has been taken of the work of ITU-T on videotex systems in its Recommendations T.100 (11/1988) and T.101 (11/1994). The work of ISO/IEC JTC 1/SC 2 which is formed from ISO TC 97/SC 2 on character repertoires and coding for all writing systems and languages also has to be taken into account.

FIGURE 2

Data line

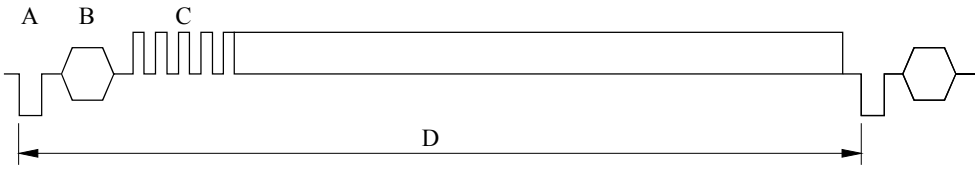


FIGURE 3

Data unit

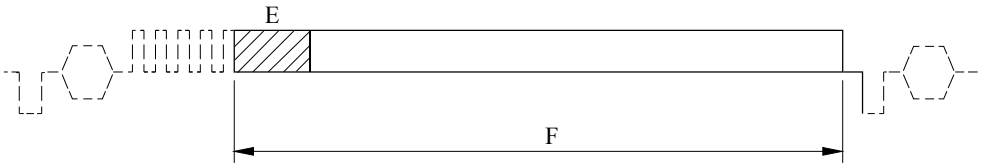


FIGURE 4

Data packet

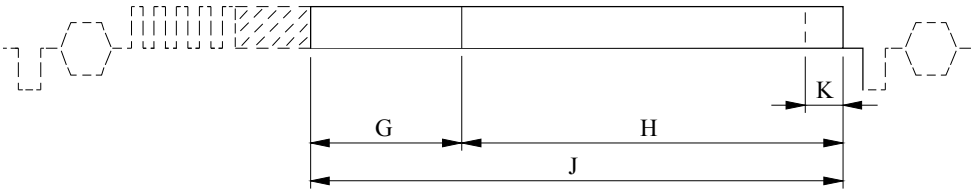
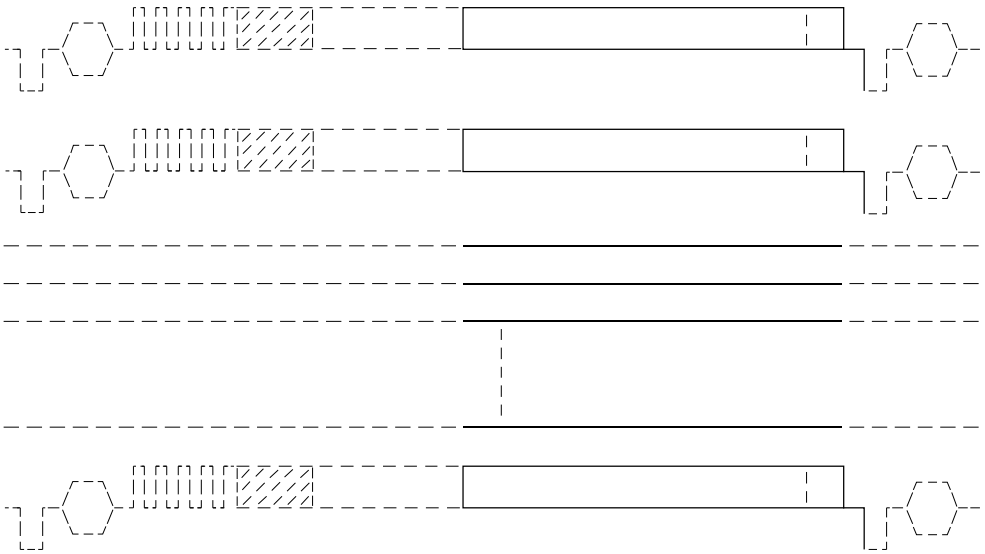


FIGURE 5

Data group



A: line sync
B: colour burst
C: bit sync
D: data line
E: byte sync
F: data unit
G: prefix
H: data block
J: data packet
K: suffix where applicable

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5.1 Repertoires

5.1.1 Alphabets and character sets

a) *Latin alphabet*

The code tables for characters and pictorial commands for the presentation of Latin alphabet based alphanumeric and pictorial information are identical to the respective Videotex code tables of the annexes of Recommendation ITU-T T.101 (11/1994), with the exception of additional characters as indicated in § 5.1.2. For some coding formats, the controls, commands and instruction sequences are also identical to those of the respective Videotex coding standards. For other formats a precisely equivalent set of controls and description/instruction sequences are defined.

b) *Cyrillic alphabet*

For the Cyrillic alphabet all characters are ISO identified (ISO/IEC 8859-5:1997) with the exception of two symbols.

The system of coding the Cyrillic symbols for the transmission of Ukrainian texts is currently submitted to Study Group 11 for consideration. Method of switching Russian/Ukrainian specific symbols is under study.

c) *Chinese character sets*

Chinese characters are very large in number and complicated in form. According to the National Standard of the People's Republic of China GB 2312 "Code of Chinese Graphic Character Set for Information Interchange Primary Set", the number of the first grade characters is 3755, and that of the second grade characters is 3008. The stipulation on encoding and character forms in GB 1988 "Information processing – 7-bit coded character set for information interchange", GB 2311 "Information processing – ISO 7-bit and 8-bit coded character sets – Code extension techniques" and the GB 5007.1-5007.2 "24 × 24 dot matrix font set and data set of Chinese ideograms for information interchange" will be followed. GB/T 12345 "Code of Chinese ideogram set of information interchange supplementary set" and the HK-subset is specially used in the teletext broadcasting of complex form from Chinese ideograms.

d) *Japanese character sets*

The Japanese language is written with mixed use of three types of Japanese characters, and sometimes with the addition of Latin alphabets. They are Katakana, Hiragana and Kanji. The Katakana and Hiragana character sets have a single-byte structure based on ISO standards and respectively contain 86 and 83 Japanese phonetic characters. The Kanji character set has a two-byte structure also based on the ISO standards and contains 2965 characters of level 1 and 3388 characters of level 2 specified in Japanese Industrial Standard (JIS) X0208:1997 which is revision of former JIS C 6226[2]. Kanji uses ideographic characters which have a close relation with Chinese characters.

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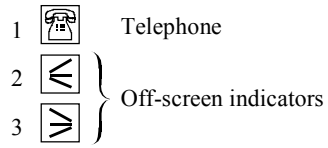
[2] Additional Kanji of 1 259 characters of level 3 and 2 436 characters of level 4 and 659 characters of non-Kanji are specified in JIS X0213:2004.

5.1.2 Special characters

Certain characters of importance for the captioning functions of teletext services are not included in any of the presentation layer syntaxes defined in Annexes to ITU-T Recommendation T.101. These are:



5.2 Source coding

5.2.1 Alphanumeric coding

These codes are used to display text. Alphanumeric graphic elements include alphabetic letters, syllabic characters and ideographic characters with or without diacritical signs, figures, punctuation marks and special signs.

5.2.2 Mosaic coding

These codes are used to construct drawings by means of block mosaic, smooth mosaic and line drawing characters. Each element defines part of a pattern and occupies one character position. Two forms of presentation are defined:

– separated: each element is surrounded by a border of the background colour;

– contiguous: elements adjoin one another.

5.2.3 Dynamically re-definable character sets (DRCS)

Character sets in which some, or all, of the characters may be defined at the source and down loaded into the receiver, which can then use them as graphic elements.

5.2.4 Geometric coding

These codes are used to construct drawings of various types by a succession of elements such as points, lines and surfaces.

5.2.5 Photographic coding

These codes are used to cause the generation of individual picture elements for the display of an image. Continuous tone images as well as pattern oriented displays including graphics characters are included.

5.2.6 Musical sound data

These codes are used to cause the generation of musical sounds. Pitch, tone duration, rhythm, timbre and harmonic relationship are defined.

TABLE 1a

Description of the essential elements of teletext systems specified for 625/50 television systems

Teletext system	A	B	C	D[1]
Layer 1: Physical				
1.1 Time slot usable for data	Active part of any TV line subject to availability			
1.2 Data positioning (relative to line sync. timing reference)[2]	10.5 ± 0.32 µs	Bit 13 is reference plus 12.0 µs (-1.0, +0.4)	10.48 ± 0.34 µs	10.5-10.97 µs[3]
1.3 Data amplitude[2] logical 0 logical 1	*S*: sync *D*: pedestal *A*: data *D*/*S* = 0 (± 3%) *A*/*S* = 7/3(+0, –10%) for positive modulation *A*/*S* = 14/9(–0, +6%) for negative modulation	Black level ± 2% 66% (± 6%) of black-to-white excursion	0 IRE units 70 IRE units for negative modulation 100 IRE units for positive modulation	0 ± 2.5 IRE units 70 ± 2.5 IRE units
1.4 Bit rate	6.203125 Mbit/s ± 0.005%	6.9375 Mbit/s ± 25×10^{-6}	5.734375 Mbit/s[4] (367 × line frequency)	5.6427875 Mbit/s ($14/11 \times f_{SC}$)
1.5 Data shaping[2]	Sine square	Spectral shaping is skew symmetrical about 0.5 bit rate	Typically a raised cosine 100% roll-off spectrum, followed by a video low pass filter	100% cosine roll-off
1.6 Data coding	Binary NRZ	Binary NRZ	Binary NRZ	Binary NRZ
1.7 Data line including clock run-in	320 bits	360 bits	288 bits (The first 16 bits of alternating 1's and 0's constitute the clock run-in)	296 bits (bytes[5] 1 to 37. Bytes 1 and 2 comprise clock run-in)
Layer 2: Link				
2.1 Digital frame synchronization	Byte 3 = 11100111	Byte 3 = 11100100	Byte BS = 11100111	Byte 3 = 11100101
2.2 Length of data unit	38 bytes	43 bytes	34 bytes (excluding clock run-in)	35 bytes
2.3 Format indicator	Byte 8 (byte 5 in short prefix)	Not required	PS byte	

NOTE 1 – For Notes see the end of Table 1b.

TABLE 1a *(Continued)*

Teletext system	A	B	C	D[1]
2.4 Error detection/correction				
2.4.1 Byte error detection – parity	Odd parity on teletext data bytes	Odd parity for bytes 4 to 45 Even parity for bytes 1 to 3	Odd parity	
2.4.2 Byte error detection/correction	8/4 Hamming code on bytes 4 to 8 (4 and 5 in short prefix)	8/4 Hamming code for bytes 4 and 5; 8/4 and 24/18 for extension packets numbers 26, 27, 28 and 29	8/4 Hamming code on all bytes in the prefix, data group header, record header	
2.4.3 Block error detection/correction	No	Bytes 44 and 45 of designated data blocks carry a cyclic redundancy check word (CRC)[6]	Suffix bytes indicated by bits b8b6 of the PS byte	(272,190) majority logic decodable difference set cyclic code on bytes 4 to 37 as a block
Layer 3: Network				
3.1 Data channel addressing	Bytes 4, 5 and 6	Bytes 4 and 5 of all packets	Bytes P1, P2, P3	Byte 4 and the data line position
3.2 Data packet sequencing	Byte 7	Bytes 4 and 5 of all packets	Byte C1	Byte 5 (bits 1 to 4)
3.3 Length of prefix	5 bytes (long prefix) or 2 bytes (short prefix)	2 bytes	5 bytes	14 bits (byte 4 and byte 5, bits 1 to 6)
3.4 Length of data block	Given by value of byte 8 (byte 5 in short prefix) according to a look-up table	40 bytes	0, 26, 27 or 28 bytes indicated by bits b8b6 of PS byte	22 bytes (D-bytes[7] 1 to 22)
Layer 4: Transport				
4.1 Group of data blocks	Start = SOH-RS (0/1-1/14) End = ETX-EOT (0/3-0/4)	In page-oriented services: – start by page header packet, bytes 4 to 13 – termination by next page header packet For independent data services: – packets 30 and 31.	Byte GT indentifying 16 types of data group	Byte 5, bit 6 = 1 and D-byte 1 = 00/1 indicate the data block contains a data group header. D-bytes 2 to 7 constitute the data group header.

TABLE 1a *(Continued)*

Teletext system	A	B	C	D[1]
4.2 Data group size	1920 bytes max.	1024 bytes or multiples of 1024 bytes	Bytes S1, S2, and F1, F2	D-bytes 4 and 5[8]
4.3 Data group integrity				
4.3.1 Continuity	No	Automatic	Byte GC	A data group is a series of data blocks sequentially transmitted in a data channel. (See 3.1 and 3.2)
4.3.2 Error detection/correction	No	Packet 27, bytes 44 and 45 of designated data blocks carry a cyclic redundancy check word (CRC)	Suffix bytes identified by bits b8b6 of the PS byte	D-bytes 21 and 22 carry a cyclic redundancy check (CRC) if D-byte 20 is 01/7, 00/3 or 00/4
4.4 Data group sequencing	No	Packets 27, bytes 7 to 42 of designated data blocks	L1, L2 for a given page address	D-byte 3[8]; byte 5, bit 5 = 1 delimits transmission units
Layer 5: Session				
5.1 Indicator of type of session				
5.1.1 Cyclic/non cyclic	Address of data channel (N2 = 96, for example)	Not required	RT = 0/RT = 1	HI[9] = 01/14 02/0 or 01/14 02/1, H-byte[10] 7, bit 1
5.1.2 Access control	Y16b2b4b6	Packet 27 and packet 29 of designated data blocks	Under study	
5.1.3 Terminal facilities	Y15b6b8	Display/processable, packet 27, byte 43 of designated data blocks	Basic TTx service recognizes: RT = 0, 1, 2 and 3; RT = 4 to 13 are reserved; RT 14 and 15 are for broadcaster use	HI = 01/14 02/0 or 01/14 02/1, H-byte 8
5.1.4 Protocol	Y11b2b4b6b8	Packet 27, byte 43 of designated data blocks		HI = 01/14 02/0 or 01/14 02/1, H-byte 7, bits 5-8
5.1.5 Batch	No	Packet 27, byte 43 of designated data blocks		HI = 01/14 02/0 or 01/14 02/1, H-byte 7, bit 2 = 1
5.1.6 Addressed to user	No	Packet 28, designated data blocks		

TABLE 1a *(Continued)*

Teletext system	A	B	C	D[1]
5.1.7 Priority	Magazine 0 (N2 = 0)	Not required	RT = 3	
5.1.8 Application	Row 0 (C1 = C2 = C3 = 0)	Packet 27, byte 43	RT = 2	
5.2 Page classification			Record designator byte, RD, bit 6 = 1 indicates presence of classification sequence	
5.2.1 Normal	C1 C2 C3 E(0...A) except 000	Not required	RT = 0 or 1 and absence of other page classification indicators	HI = 01/14 02/1 H-byte 7, bit 3 = 0 and bit 4 = 0 and H-byte 9, bit 5 = 0 and bit 6 = 0
5.2.2 Subtitle	C1 C2 C3 = 10 Y22b8 = 0	Control bit in page header packet	$Y1_3$ b8 = 1	HI = 01/14 02/1, H-byte 7, bit 3 = 1 and bit 4 = 1
5.2.3 Delayed/inhibited display	Y13b8 = 1	Control bit in page header packet	$Y1_3$ b6 = 1	
5.2.4 Linked	Y25Y26	Packet 27, byte 43 of designated data blocks	Header extension bytes (HE)	All pages in a batch-type programme are linked (see 5.1.5) HI = 01/14 02/0, H-byte 9, bits 1 to 4 indicate the page linkage structure
5.2.5 Index	Y12b4 = 1	See 5.3	$Y1_3$ b4 = 1	
5.2.6 Alarm	Y12b8 = 1	See 5.3	$Y1_5$ b8 = 1, $Y1_5$ b6 = 1 (RT = 3)	
5.2.7 Update	Y13b4b6 Y12b6	Control bit in page header packet	$Y1_5$ b4 = 1, version # ($Y1_6$) updated	HI = 01/14 02/0 or 01/14 02/1, H-byte 10, bit 2
5.2.8 Priority	C1 = C2 = C3 = A	See 5.3	$Y1_5$ b8 = 1, $Y1_5$ b6 = 0 (RT = 3) (Applies only to television mode)	
5.2.9 Programme related	Y22b8 = 0	Packet 30, bytes 17 to 25 of designated data blocks	See subtitle and priority page classifications	HI = 01/14 02/0 or 01/14 02/1, H-byte 7, bit 3 = 1 and bit 4 = 0
5.2.10 Newsflash	Y22b8 = 0	Control bit in page header packet	Access through data channel B00, page address 0. $Y1_6$ updated	HI = 01/14 02/1, H-byte 9, bit 5 = 1 and bit 6 = 0 and H-byte 7, bit 3 = 0 and bit 4 = 0

TABLE 1a *(Continued)*

Teletext system	A	B	C	D[1]
5.2.11 Support	No	Packet 27, bytes 7 to 42 of designated data blocks	Support record address FFF, $Y15$ b2 = 1 Support needed $Y14$ b2 = 1	HI = 01/14 02/0
5.2.12 Scrolling	No	Scrolling region defined by packet 26, bytes 7 to 45 of designated data blocks		HI = 01/14 02/1, H-byte 9, bit 6 = 1
5.2.13 Cover	Y22b4 = 1	Control bit in page header packet	Data channel 0, page 0 or other page 0 addresses	
5.2.14 Reveal	Y13b8 = 0	Control bit in page header packet or user operation	$Y15$ b8 = 0, $Y15$ b6 = 1 (RT = 3)	
5.3 Page access information				
5.3.1 Network label	Row 0 (C1= C2 = C3 = 0) or N2 = ∈(0 or 99)	Packet 30, bytes 13 and 14 of designated data blocks	RT = 2	HI = 01/14 02/2, H-bytes 5 to 7
5.3.2 Date and time	Row 0 (C1 = C2 = C3 = 0), if any	Packet 30, bytes 15 to 21 of designated data blocks	RT = 2	
5.3.3 Page address	C1 C2 C3	Bytes 6 and 7 of page header packet	$A1$ $A2$ $A3$ and RD b2 = 1 for $A4$-$A9$ (extended address)	HI = 01/14 02/0 or 01/14 02/1, or 01/14 02/3, H-byte 4, bits 1 to 4 and H-byte 5 (PR = 000 ~ 999)
5.3.4 Sub-page address	If Y12b6 = 0, then Y25 Y26	Bytes 8 to 11 of page header packet	$Y14$ b8 = 1 (more) and extended address as above	HI = 01/14 02/1, H-byte 6 (PA = 00 ~ 99)
5.3.5 Logical data delimiter	Not required, see presentation layer	Not required	Not required. Consequence of record header format itself	01/14 N: HI[9] (N: parameter byte) 01/15 N: DI[11] (N: parameter byte)
5.3.6 Page reconstruction	L	Not required	Update defined by $Y15$ b4 = 1 and $Y16$ (version #)	HI = 01/14 02/3
5.3.7 Cyclic marker	No	Not required	$Y14$ b6 = 1 (RT = 3) (Subcycle marker if RT = 0 or 1)	

TABLE 1a *(Continued)*

Teletext system	A	B	C	D[1]
5.3.8 Programme identification	N2 = 0, row 0	Packet 30, bytes 22 to 25 of designated data blocks	RT = 2	HI = 01/14 02/2, DI = 01/15 03/13
5.3.9 Initial page address	Cover page, Y12b2	Packet 30, bytes 7 to 12 of designated data blocks	Data channel 0, page 0	
5.3.10 Search indicator	No	Packet 27, byte 6 of designated data blocks	RT = 2	
5.3.11 Auto acquisition	If Y12b6 = 0, then Y25 Y26 + C1 C2 C3	As 5.3.9 and 5.3.12	$Y1_4$ b4 = 1	
5.3.12 Page linking	No	Packet 27, bytes 7 to 42 of designated data blocks	Header extension bytes (HE)	HI = 01/14 02/1, DI = 01/15 03/5, P-byte[12] 5 to 9
5.4 Conditional access				
5.4.1 Control word synchronization	First US of an article	Packet 28, bytes 7 to 45 of designated data blocks	Under study	
5.4.2 Initialization complement	C1 C2 C3 L	Packet 28, bytes 7 to 45 of designated data blocks		
5.4.3 Entitlement checking messages	C1 C2 C3 = FFF, US 3/F 3/F	Packet 1 to 24 when designated for this function		
5.4.4 Audience segmentation	Y16b2b4b6	Packet 28, bytes 7 to 45 of designated data blocks		
5.4.5 Descrambling generator	Pseudo-random generator	See 5.4.1		
5.4.6 Descrambling procedure	XOR	See 5.4.1		
Layer 6: Presentation	ITU-T Recommendation T.101 Annex C, Data Syntax II	[13] [14]	ITU-T Recommendation T.101[15] Annex D, Data Syntax III	
Layer 7: Application	Practical use of the potential facilities provided by the lower layers leads to services such as: access to pages of information, music with text, subtitling, telesoftware, etc.			

TABLE 1b

Description of the essential elements of teletext systems specified for 525/60 television systems

Teletext system	A	B	C	D
Layer 1: Physical				
1.1 Time slot usable for data	Active part of any TV line subject to availability			
1.2 Data positioning (relative to line sync. timing reference)(2)		Bit 13 is reference plus 11.7 µs (± 0.175)	10.48 ± 0.34 µs	9.78 ± 0.35 µs
1.3 Data amplitude(2) logical "0" logical "1"		Black level ± 2% 70% (± 6%) of black-to-white excursion	0 IRE units 70 IRE units for negative modulation 100 IRE units for positive modulation	0 ± 2.5 IRE units 70 ± 2.5 IRE units
1.4 Bit rate		5.727272 Mbit/s ± 25 × 10^{-6}	5.727272 Mbit/s(3) (364 × line frequency)	5.727272 Mbit/s ± 3 × 10^{-6} (364 × f_H; 8/5 × f_{SC})
1.5 Data shaping(2)		Spectral shaping is skew symmetrical about 0.5 bit rate	Typically a raised cosine 100% roll-off spectrum, followed by a video low pass filter	Spectrum shaping... Controlled cosine roll-off, roll-off factor 0.6, cut-off frequency 0.5 × bit rate
1.6 Data coding		Binary NRZ	Binary NRZ	Binary NRZ
1.7 Data line including clock run-in		296 bits	288 bits (The first 16 bits of alternating 1's and 0's constitute the clock run-in)	296 bits (bytes(5) 1 to 37. Bytes 1 and 2 comprise clock run-in)
Layer 2: Link				
2.1 Digital frame synchronization		Byte 3 = 11100100	Byte BS = 11100111	Byte 3 = 11100101
2.2 Length of data unit		35 bytes	34 bytes (excluding clock run-in)	35 bytes
2.3 Format indicator		Not required	PS byte	

TABLE 1b *(Continued)*

Teletext system	A	B	C	D
2.4 Error detection/correction				
2.4.1 Byte error detection – parity		Odd parity for bytes 4 to 37 Even parity for bytes 1 to 3	Odd parity	
2.4.2 Byte error detection/correction		8/4 Hamming code for bytes 4 and 5; 8/4 and 24/18 for extension packets numbers 26, 27, 28 and 29	8/4 Hamming code on all bytes in the prefix, data group header, record header	
2.4.3 Block error detection/correction		Bytes 7 and 8 of designated data blocks carry a cyclic redundancy check word (CRC)(6)	Suffix bytes indicated by bits b8b6 of the PS byte	(272,190) majority logic decodable difference set cyclic code on bytes 4 to 37 as a block
Layer 3: Network				
3.1 Data channel addressing		Bytes 4 and 5 of all packets	Bytes P1, P2, P3	Byte 4 and the data line position
3.2 Data packet sequencing		Bytes 4 and 5 of all packets	Byte CI	Byte 5 (bits 1 to 4)
3.3 Length of prefix		2 bytes	5 bytes	14 bits (byte 4 and byte 5, bits 1 to 6)
3.4 Length of data block		32 bytes	0, 26, 27 or 28 bytes indicated by bits b8b6 of PS byte	22 bytes (D-bytes(7) 1 to 22)
Layer 4: Transport				
4.1 Group of data blocks		In page-oriented services: – start by page header packet, bytes 4 to 13 – termination by next page header packet For independent data services: – packets 30 and 31.	Byte GT indentifying 16 types of data group	Byte 5, bit 6 = 1 and D-byte 1 = 00/1 indicate the data block contains a data group header. D-bytes 2 to 7 constitute the data group header.
4.2 Data group size		1024 bytes or multiples of 1024 bytes	Bytes S1, S2, and F1, F2	D-bytes 4 and 5(8)

TABLE 1b *(Continued)*

Teletext system	A	B	C	D
4.3 Data group integrity				
4.3.1 Continuity		Automatic	Byte GC	A data group is a series of data blocks sequentially transmitted in a data channel. (See 3.1 and 3.2)
4.3.2 Error detection/correction		Packet 27, bytes 7 and 8 of designated data blocks carry a cyclic redundancy check word (CRC)	Suffix bytes identified by bits b8b6 of the PS byte	D-bytes 21 and 22 carry a cyclic redundancy check (CRC) if D-byte 20 is 01/7, 00/3 or 00/4
4.4 Data group sequencing		Packet 27, bytes 7 to 36 of designated data blocks	L1, L2 for a given page address	D-byte 3[(8)]; byte 5, bit 5 = 1 delimits transmission units
Layer 5: Session				
5.1 Indicator of type of session				
5.1.1 Cyclic/non cyclic		Not required	RT = 0/RT = 1	HI[(9)] = 01/14 02/0 or 01/14 02/1, H-byte[(10)] 7, bit 1
5.1.2 Access control		Packet 27 and packet 29, bytes 7 to 36 of designated data blocks	Under study	
5.1.3 Terminal facilities		Display/processable, packet 27, byte 37 of designated data blocks	Basic TTx service recognizes: RT = 0, 1, 2 and 3; RT = 4 to 13 are reserved; RT = 14 and 15 are for broadcaster use	HI = 01/14 02/0 or 01/14 02/1, H-byte 8
5.1.4 Protocol		Packet 27, byte 37 of designated data blocks		HI = 01/14 02/0 or 01/14 02/1, H-byte 7, bits 5-8
5.1.5 Batch		Packet 27, byte 37 of designated data blocks		HI = 01/14 02/0 or 01/14 02/1, H-byte7, bit 2 = 1
5.1.6 Addressed to user		Packet 28, designated data blocks		
5.1.7 Priority		Not required	RT = 3	
5.1.8 Application		Packet 27, byte 37	RT = 2	

TABLE 1b *(Continued)*

Teletext system	A	B	C	D
5.2 Page classification			Record designator byte, RD, bit 6 = 1 indicates presence of classification sequence	
5.2.1 Normal		Not required	RT = 0 or 1 and absence of other page classification indicators	HI = 01/14 02/1 H-byte 7, bit 3 = 0 and bit 4 = 0 and H-byte 9, bit 5 = 0 and bit 6 = 0
5.2.2 Subtitle		Control bit in page header packet	$Y1_3$ b8 = 1	HI = 01/14 02/1, H-byte 7, bit 3 = 1 and bit 4 = 1
5.2.3 Delayed/inhibited display		Control bit in page header packet	$Y1_3$ b6 = 1	
5.2.4 Linked		Packet 27, byte 37 of designated data blocks	Header extension bytes (HE)	All pages in a batch-type programme are linked (see 5.1.5) HI = 01/14 02/0, H-byte 9, bits 1 to 4 indicate the page linkage structure
5.2.5 Index		See 5.3	$Y1_3$ b4 = 1	
5.2.6 Alarm		See 5.3	$Y1_5$ b8 = 1, $Y1_5$ b6 = 1 (RT = 3)	
5.2.7 Update		Control bit in page header packet	$Y1_5$ b4 = 1, version # ($Y1_6$) updated	HI = 01/14 02/0 or 01/14 02/1, H-byte 10, bit 2
5.2.8 Priority		See 5.3	$Y1_5$ b8 = 1, $Y1_5$ b6 = 0 (RT = 3) (Applies only to television mode)	
5.2.9 Programme related		Packet 30, bytes 17 to 25 of designated data blocks	See subtitle and priority page classifications	HI = 01/14 02/0 or 01/14 02/1, H-byte 7, bit 3 = 1 and bit 4 = 0
5.2.10 Newsflash		Control bit in page header packet	Access through data channel B00, page address 0. $Y1_6$ updated	HI = 01/14 02/1, H-byte 9, bit 5 = 1 and bit 6 = 0 and H-byte 7, bit 3 = 0 and bit 4 = 0

TABLE 1b *(Continued)*

Teletext system	A	B	C	D
5.2.11 Support		Packet 27, bytes 7 to 36 of designated data blocks	Support record address FFF, $Y15$ b2 = 1 Support needed $Y14$ b2 = 1	HI = 01/14 02/0
5.2.12 Scrolling		Scrolling region defined by packet 26, bytes 7 to 36 of designated data blocks		HI = 01/14 02/1, H-byte 9, bit 6 = 1
5.2.13 Cover		Control bit in page header packet	Data channel 0, page 0 or other page 0 addresses	
5.2.14 Reveal		Control bit in page header packet or user operation	$Y15$ b8 = 0, $Y15$ b6 = 1 (RT = 3)	
5.3 Page access information				
5.3.1 Network label		Packet 30, bytes 13 and 14 of designated data blocks	RT = 2	HI = 01/14 02/2, H-bytes 5 to 7
5.3.2 Date and time		Packet 30, bytes 15 to 21 of designated data blocks	RT = 2	
5.3.3 Page address		Bytes 6 and 7 of page header packet	$A1$ $A2$ $A3$ and RD b2 = 1 for $A4$-$A9$ (extended address)	HI = 01/14 02/0 or 01/14 02/1, or 01/14 02/3, H-byte 4, bits 1 to 4 and H-byte 5 (PR = 000 ~ 999)
5.3.4 Sub-page address		Bytes 8 to 11 of page header packet	$Y14$ b8 = 1 (more) and extended address as above	HI = 01/14 02/1, H-byte 6 (PA = 00 ~ 99)
5.3.5 Logical data delimiter		Not required	Not required. Consequence of record header format itself	01/14 N: HI(9) (N: parameter byte) 01/15 N: DI(11) (N: parameter byte)
5.3.6 Page reconstruction		Not required	Update defined by $Y15$ b4 = 1 and $Y16$ (version #)	HI = 01/14 02/3
5.3.7 Cyclic marker		Not required	$Y14$ b6 = 1 (RT = 3) (subcycle marker if RT = 0 or 1)	

TABLE 1b *(Continued)*

Teletext system	A	B	C	D
5.3.8 Programme identification		Packet 30, bytes 22 to 25 of designated data blocks	RT = 2	HI = 01/14 02/2, DI = 01/15 03/13
5.3.9 Initial page address		Packet 30, bytes 7 to 12 of designated data blocks	Data channel 0, page 0	
5.3.10 Search indicator		Packet 27, byte 6 of designated data blocks	RT = 2	
5.3.11 Auto acquisition		As 5.3.9 and 5.3.12	$Y1_4$ b4 = 1	
5.3.12 Page linking		Packet 27, bytes 7 to 36 of designated data blocks	Header extension bytes (HE)	HI = 01/14 02/1, DI = 01/15 03/5, P-byte(12) 5 to 9
5.4 Conditional access				
5.4.1 Control word synchronization		Packet 28, bytes 7 to 36 of designated data blocks	Under study	Under study
5.4.2 Initialization complement		Packet 28, bytes 7 to 36 of designated data blocks		
5.4.3 Entitlement checking messages		Packet 1 to 25 when designated for this function		
5.4.4 Audience segmentation		Packet 28, bytes 7 to 36 of designated data blocks		
5.4.5 Descrambling generator		See 5.4.1		
5.4.6 Descrambling procedure		See 5.4.1		
Layer 6: Presentation		(14)	ITU-T Recommendation T.101(13) Annex D, Data Syntax III	(15)
Layer 7: Application	Practical use of the potential facilities provided by the lower layers leads to services such as: access to pages of information, music with text, subtitling, telesoftware, etc.			

Notes to Tables 1a and 1b:

(1) Parameters for the PAL television system.

(2) Parameters for data positioning, amplitude and shaping may be altered to suit particular transmission requirements.

(3) Odd field: the leading edge of multiplexed packet with line 8H is the position at 10.97 ms from line sync. In other lines, the packets are multiplexed sequentially from 8H, at 361-bit intervals.

Even field: the leading edge of multiplexed packet with 321H (in pairs with 8H) is a point 113 036 bit/s from 8H. Other packets are multiplexed at the same intervals as in the odd field.

(4) Bit rate parameter may be altered to suit particular transmission requirements.

(5) "Byte" number indicates a byte position in the data line.

(6) Data packet X/25 is used for vertical odd parity for bytes 3-42 of each basic data packet X/1-X/24 in the Chinese character set.

(7) "D-byte" number indicates a byte position in the data block.

(8) Data group header bytes (see 4.1).

(9) Data header identifier (see 5.3.5).

(10) "H-byte" number indicates a byte position in a data header.

(11) Protocol data unit identifier.

(12) "P-byte" number indicates a byte position in the protocol data unit.

(13) Latin alphabets based on ISO 6937 with subsets for French, German, Slavic languages, etc., coding for 12 syllabic writing systems in use in the Indian sub-continent and adjacent areas, are specified as are two byte systems for coding idiographic characters used in many languages throughout the world (Kanji, Katakana, Hiragana, Hangul, etc.).

(14) China has realized an extension of the character set of system B in order to accommodate Chinese characters. This extension is specified in the "Chinese Character System Teletext (CCST) Broadcasting Specification" GB/T 14219-93.

(15) Caters for all Latin and non-Latin graphic sets such as Greek, Cyrillic, Arabic, Chinese Hanzi, etc., registered in accordance with ISO/IEC 2375: 2003.

TABLE 1c

Description of essential elements of teletext systems specified for use with the packet multiplex of the MAC/packet systems

Teletext system	A	B	C	D
Layer 1: Physical				
1. Data	As MAC/packet data component			
Layer 2: Link				
2.1 Service identification data	MAC/packet address “0”			
2.2 List of services	LISTX parameter ′18 in MAC/packet address “0”			
2.3 LISTX item	TELETEXT coded ′03			
2.4 Digital component information parameter DCINF in MAC/packet “0”, parameter identifier values		′B0 Teletext ′B1 Teletext subtitles ′B2 Replacement teletext ′B3 Programme delivery control		
2.5 Access coordinates: 16 bits associated with DCINF parameter		4 most significant bits indicate level of error protection ′1 First level ′2 Second level		
2.6 Complementary access coordinates		Optional 2-byte extension of access coordinates Byte 1, 3 LSBs: magazine number Byte 2: page number		
2.7 Error detection/correction		Level 1: 2 teletext packets in each data block plus a CRC check digit Level 2: 12-bit data words have 11-bit Golay Code and parity bit		
Other layers comprise teletext data as in Table 1a or 1b				

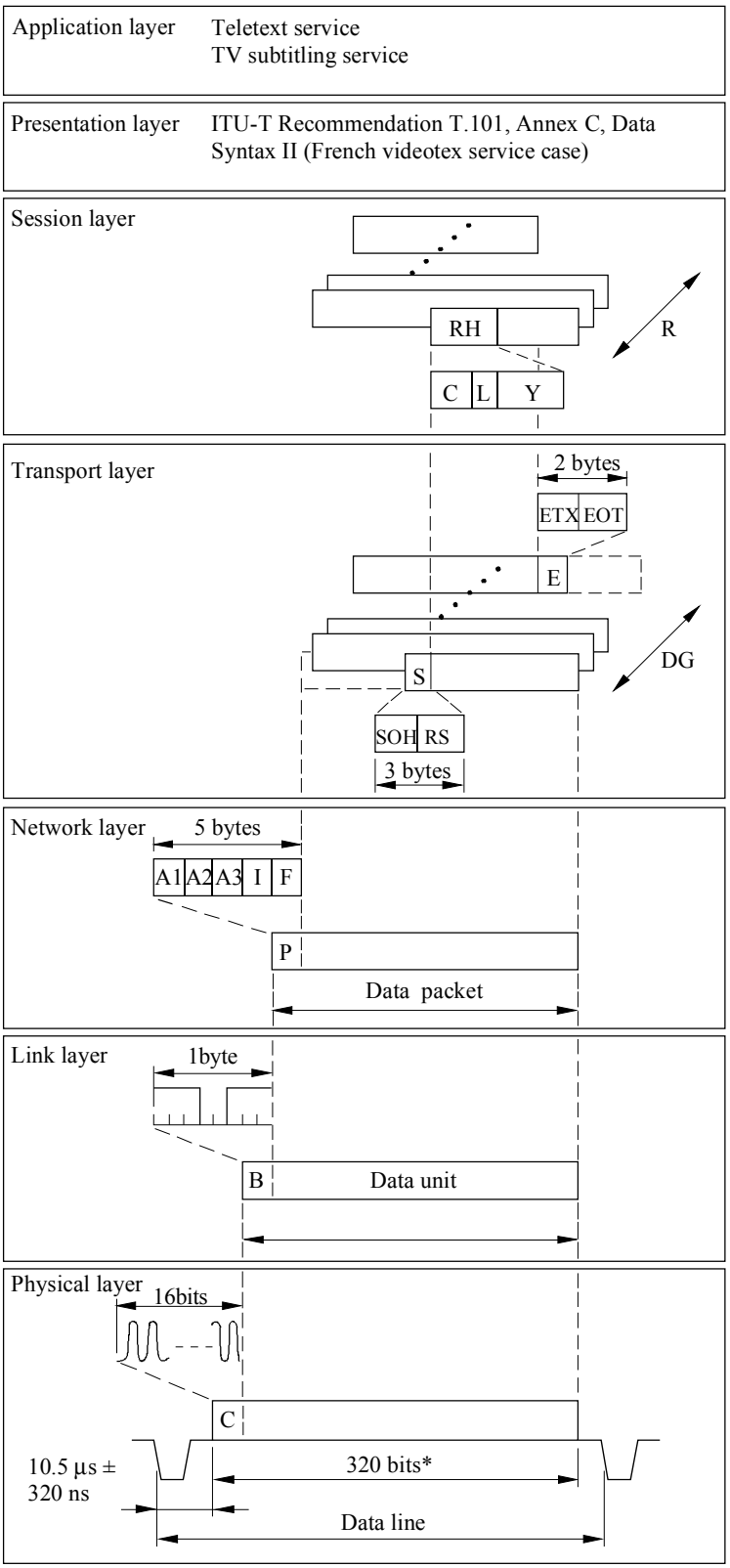
TABLE 1d

Description of essential elements of teletext systems specified for use with the digital multiplex of the NICAM 728 sound system

Teletext system	A	B	C	D
Layer 1: Physical				
1. Data	As NICAM 728 system data component when signalled as carrying independent data			
Layer 2: Link				
2.1 Data frame		Includes frame alignment word, control data, component information, 88 bytes teletext data		
2.2 Component information		Signals 2 levels of protection as in Table 1c, 2.5		
2.3 Error protection/correction		2 levels of protection similar to that of Table 1c, 2.7		
Other layers comprise teletext data as in Table 1a or 1b				

FIGURE 6

Layered structure of teletext system A



* See Note 2 of Tables 1a and 1b

FIGURE 7

Layered structure of teletext system B

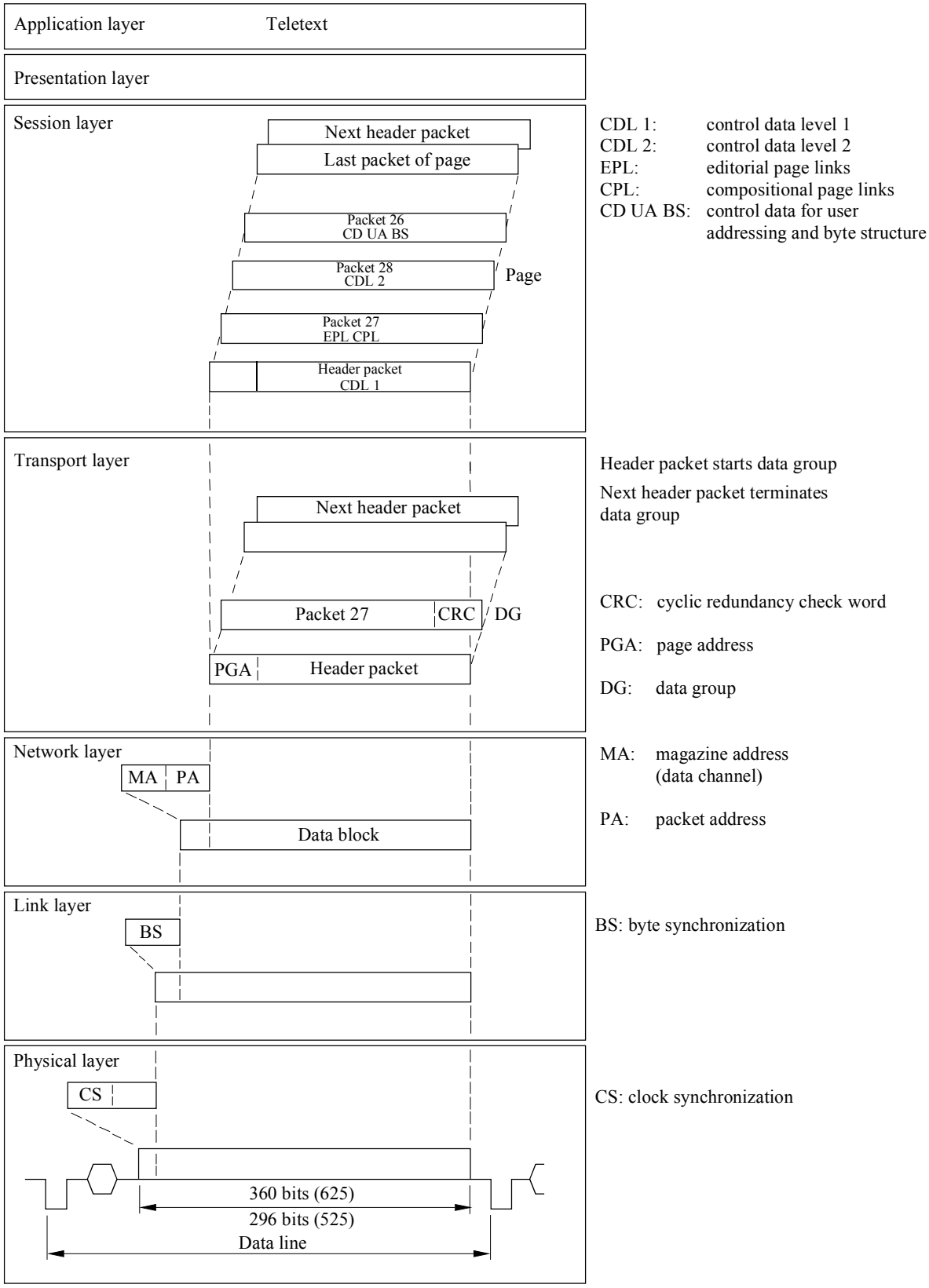


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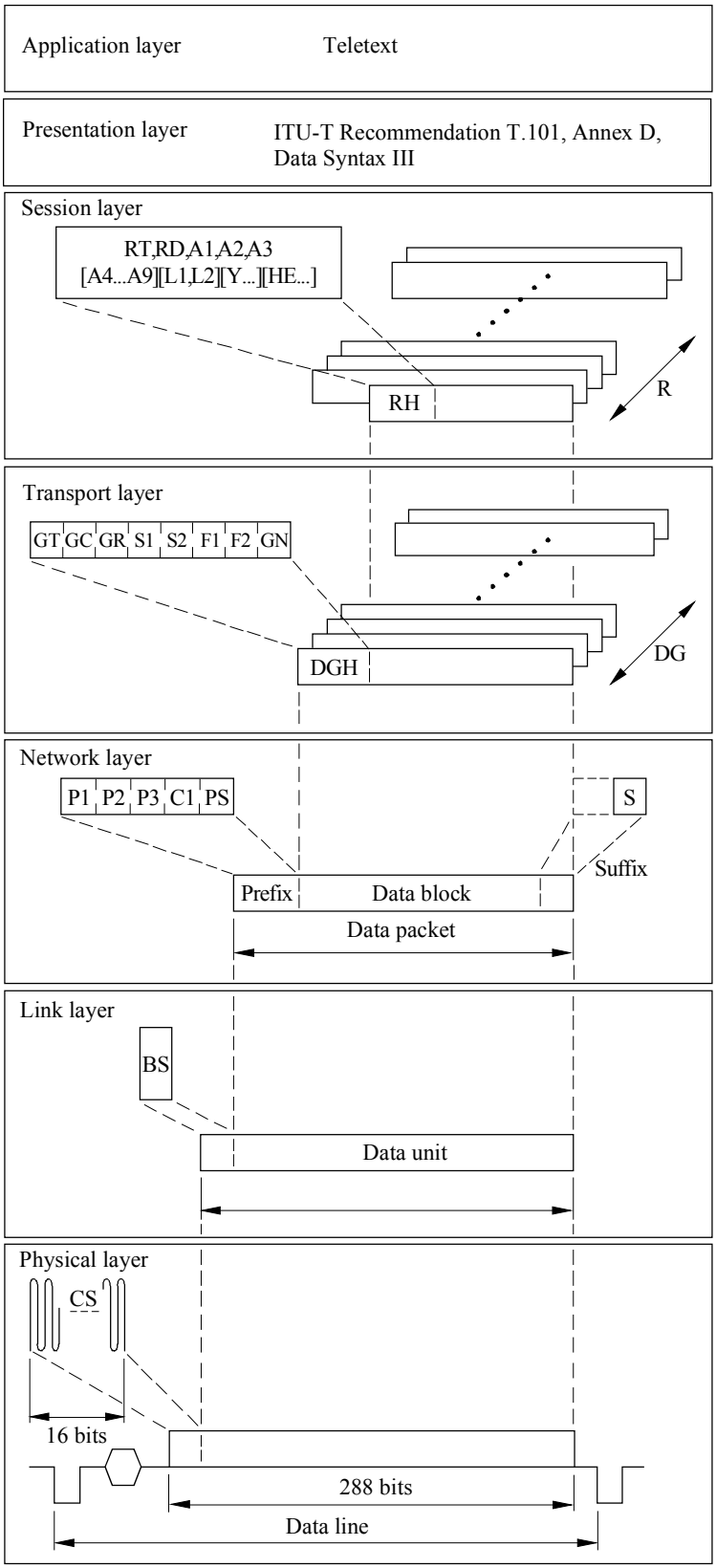
FIGURE 8

Layered structure of teletext system C



R: record
RH: record header
RT: record type
RD: record header designator
A1, A2, A3: record address
A4, A5, A6, A7, A8, A9: optional record address extension
L1, L2: optional record link
Y: optional classification sequence
HE: optional header extension field (5)

DG: data group
DGH: data group header
GT: data group type
GC: data group continuity
GR: data group repetition
S1, S2: data group size
F1, F2: final non-zero block size
GN: data group network routing

P1, P2, P3: packet address bytes
CI: continuity index byte
PS: packet structure byte
S: suffix

BS: byte synchronization byte

CS: clock synchronization bits

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FIGURE 9

Layered structure of teletext system D

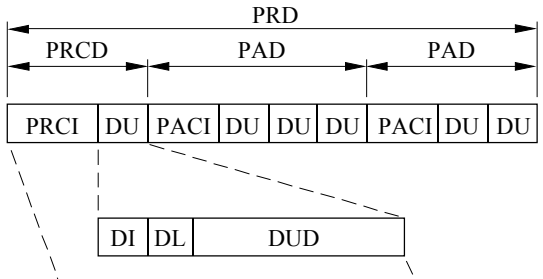
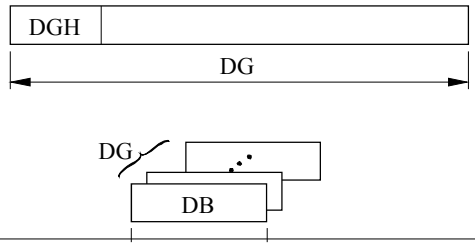
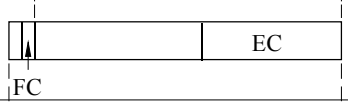
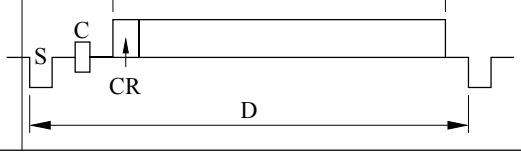
Layer	Principal function	Processing of data
Layer 7: Application	Programme services	– Subtitle, cyclic, batch and pseudo-interactive programme, etc. – User's programme selection and response
Layer 6: Presentation	Presentation coding	– Character and DRCS coding – Photographic coding – Geometric coding – Music coding
Layer 5: Session	Identification and control of programme data	 PRD: programme data PRCD: programme control data PAD: page data PRCI: programme control information PACI: page control information DU: protocol data unit DI: data unit identifier DL: data unit length DUD: data unit data
Layer 4: Transport	Data transmission control	 DG: data group DGH: data group header DB: data block
Layer 3: Network	Multiplexing of data packet	 DP: data packet P: prefix (14 bits) DB: data block (176 bits, 22 bytes)
Layer 2: Link	Digital frame sync and error control	 FC: framing code (8 bits) EC: error correcting check bit (82 bits)
Layer 1: Physical	Physical transmission	 D: data line (296 bits; 37 bytes) S: line-sync. signal C: colour burst CR: clock run-in (16 bits)

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TABLE 2*

Teletext systems used in various countries/geographical areas

Country/geographical area	Teletext system specified	Remarks
Germany (Federal Republic of)	B	
Australia	B	
Belgium	A and B	
Bosnia and Herzegovina (Republic of)		
Brazil (Federative Republic of)	C	Modified
Burkina Faso	None	
Canada	C	
China (People's Republic of)	B	Extended character set with Chinese characters
Cyprus (Republic of)	None	
Colombia (Republic of)	A	
Croatia (Republic of)		
Denmark	B	
Spain	B	Primary character set with national variations to accommodate Basque, Catalan and Galician
United States of America	C	
Finland	B	
France	A	
India (Republic of)	A	
Italy	B	
Japan	D	
Macedonia (Former Yugoslav Republic of)		
Malaysia	B	
Malawi	None	
Maldives (Republic of)	None	
Mexico	None	
Norway	B	
New Zealand	B	
Oman (Sultanate of)	None	
Netherlands (Kingdom of the)	B	
Poland (Republic of)	B	Experimentally
Syrian Arab Republic	None	
United Kingdom of Great Britain and Northern Ireland	B	
Slovenia (Republic of)		
South Africa (Republic of)	B	Primary character set with national variations to also accommodate the Afrikaans language
Singapore (Republic of)	B	
Sweden	B	
Turkey	B	Primary character set with national variations to accommodate the Turkish alphabet
Ukraine	B	
Yugoslavia (Federal Republic of)	B	Extended character set

* Administrations are invited to provide the appropriate entries for Table 2.