

Multimedia home server systems — Interchangeable volume/file structure adaptation for broadcasting receivers —

Part 2: General recording structure

The European Standard EN 62328-2:2005 has the status of a British Standard

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National foreword

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**Multimedia home server systems –
Interchangeable volume/file structure adaptation
for broadcasting receivers
Part 2: General recording structure
(IEC 62328-2:2005)**

Systèmes de serveurs multimédia
grand public –
Adaptation aux récepteurs
de radiodiffusion des structures
de volumes/fichiers interchangeables
Partie 2: Structure générale
d'enregistrement
(CEI 62328-2:2005)

Multimediaserver für den Heimgebrauch –
Anpassung der austauschbaren
Datenträger-/Dateistruktur für
Rundfunkempfänger
Teil 2: Allgemeine Aufzeichnungstruktur
(IEC 62328-2:2005)

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

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Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62328-2:2005 was approved by CENELEC as a European Standard without any modification.

CONTENTS

INTRODUCTION.....	7
1 Scope	8
2 Normative references	8
3 Definitions	8
4 Abbreviations	9
5 Notation	10
5.1 Numerical values	10
6 General	11
6.1 Generic timestamp (GTS)	11
6.2 Timestamp on AV stream (TSAVS).....	13
6.3 Duration	14
6.4 Dstring[n]	14
6.5 Generic pointer position format	15
6.6 Generic thumbnail pointer format	16
6.7 Mark entry format	19
7 File and directory.....	23
7.1 Composition of directories	23
7.2 File composition of the RT_TVRS directory	50
7.3 Location indication rule	75
7.4 Naming rule.....	75
Annex A (normative) Main TS stream file structure and its allocation.....	77
Annex B (informative) Location notation example	80
Annex C (informative) Relationship between pointer and stream	81
Annex D (informative) Example of an external thumbnail file structure	85
Annex ZA (normative) Normative references to international publications with their corresponding European publications	89
Bibliography	88
Figure 1 – File structure	24
Figure 2 – PROG_SET.MGR	37
Figure 3 – EXT_PS.MGR	44
Figure 4 – RT_TVRS directory	50
Figure 5 – Structure of PROGxxxx.PIF	50
Figure 6 – Structure of programme information.....	52
Figure 7 – Examples of files and directories	76
Figure A.1 – Transport stream packet.....	77
Figure A.2 – Recording packet	77
Figure A.3 – Aligned unit.....	77
Figure A.4 – Allocation unit	78
Figure A.5 – Structure of TYPE1 RP header	78
Figure A.6 – Structure of TYPE2 RP header	79

Figure C.1 – Access unit point of video ES	81
Figure C.2 – Access unit point of recording packet	82
Figure C.3 – Module access unit point.....	82
Figure C.4 – Recording data packet access unit point.....	83
Figure C.5 – Relationship between mark point and AV stream	84
Figure D.1 – External thumbnail file structure	85
Table 1 – Structure of GTS	11
Table 2 – Structure of TTZ	11
Table 3 – Structure of EI	12
Table 4 – Day-of-week interpretation.....	12
Table 5 – Structure of TSAVS	13
Table 6 – Structure of AVTS	13
Table 7 – Frame rate interpretation	13
Table 8 – Structure duration.....	14
Table 9 – Structure of Dstring[n]	14
Table 10 – Interpretation of character set	15
Table 11 – Structure of GPPF	15
Table 12 – Structure of BASEP	15
Table 13 – Block_Length interpretation	16
Table 14 – Structure of LGTPF.....	16
Table 15 – Structure of TTYPE.....	17
Table 16 – Thumbnail compression type interpretation	17
Table 17 – Structure of SGTPF	18
Table 18 – Structure of LMEF	19
Table 19 – Mark type interpretation	20
Table 20 – Structure of FLMEF	20
Table 21 – Structure of PIDPLUS	21
Table 22 – PID_Type interpretation	22
Table 23 – Structure of SMEF	22
Table 24 – Structure of PGR	24
Table 25 – Structure of VER	25
Table 26 – Structure of PGRTYPE	25
Table 27 – Structure of PGRSA.....	28
Table 28 – PGR specific area TYPE interpretation.....	28
Table 29 – Structure of TYPE1 PGRSA	29
Table 30 – Structure of FL1.....	29
Table 31 – Structure of TYPE 2 PGRSA	30
Table 32 – Structure of FL2.....	31
Table 33 – TSI type interpretation	31
Table 34 – Structure of TYPE3 PGRSA	33
Table 35 – Structure of PGRG.....	33
Table 36 – Structure of VER	34

Table 37 – Structure of PGRGTYPE	34
Table 38 – Structure of RMETYPE	36
Table 39 – Structure of PGRGSA	36
Table 40 – PGRG specific area TYPE interpretation	36
Table 41 – Structure of TYPE1 PGRGSA.....	37
Table 42 – Structure of PROG_SET.MGR	38
Table 43 – Structure of user interface entry information	38
Table 44 – PGR general information.....	39
Table 45 – Structure of PGRGIF.....	39
Table 46 – PGRG general information	40
Table 47 – Structure of PGRGGIF	40
Table 48 – Structure of PGReferences	42
Table 49 – Structure of PGRGroups	42
Table 50 – Structure of PGRG_xxxxxxxx stream file	43
Table 51 – Structure of FLPGRG.....	43
Table 52 – Structure of EXT_PS.MGR.....	44
Table 53 – Structure EI	45
Table 54 – File type of structure EI.....	46
Table 55 – Structure of FLEI	46
Table 56 – Structure of EISA.....	47
Table 57 – Extended info TYPE interpretation	47
Table 58 – Structure of TYPE1 EISA	47
Table 59 – Structure of MetaDataTable	48
Table 60 – Structure of MDE	48
Table 61 – MDE TYPE interpretation.....	48
Table 62 – Structure of MarkTable	49
Table 63 – Structure of programme management header.....	51
Table 64 – Structure of programme general information.....	52
Table 65 – Programme identification type interpretation.....	52
Table 66 – Recorded stream type interpretation.....	53
Table 67 – Service type interpretation	53
Table 68 – Structure of FLPGI.....	53
Table 69 – Structure of broadcasting TV programme information	54
Table 70 – BTVPI TYPE interpretation.....	54
Table 71 – Structure of recording information	55
Table 72 – Structure of component information.....	55
Table 73 – COMPI TYPE interpretation	55
Table 74 – Structure of time search information.....	56
Table 75 – Structure of TSIF	56
Table 76 – Structure of ACUIE	57
Table 77 – Structure of FLACUIE	58
Table 78 – Structure of PIDPLUS2	58

Table 79 – PID_Type Interpretation.....	58
Table 80 – Structure of ALUIE.....	59
Table 81 – Structure of TUIE.....	59
Table 82 – Structure of license information.....	60
Table 83 – Structure of LIF	60
Table 84 – Rights management specification identifier interpretation.....	61
Table 85 – Cipher algorithm interpretation.....	61
Table 86 – Structure of CASTYPE.....	61
Table 87 – Key length interpretation.....	62
Table 88 – TYPE 1 interpretation	62
Table 89 – Encrypted area on AV stream interpretation	62
Table 90 – CBC type interpretation.....	63
Table 91 – Structure of other information.....	64
Table 92 – Structure of OIF.....	64
Table 93 – Structure of AccessUnitInfo stream file.....	65
Table 94 – Structure of ACUE	65
Table 95 – Structure of ACUTP	66
Table 96 – PTYPE interpretation	66
Table 97 – Structure of AllocationUnitInfo stream file.....	67
Table 98 – Structure of ALUE.....	67
Table 99 – Structure of TimeUnitInfo stream file	67
Table 100 – Structure of TUE.....	68
Table 101 – Structure of CipherInfo stream file.....	68
Table 102 – Structure of CIF	68
Table 103 – LETYPE interpretation	69
Table 104 – Structure of LERE.....	69
Table 105 – Structure of LFLAG.....	70
Table 106 – Structure of IndexInfo stream file.....	71
Table 107 – Structure of IERE.....	72
Table 108 – Structure of DataInfo stream file.....	72
Table 109 – Structure DCE	73
Table 110 – Structure of *UDF_LICENSE stream file	73
Table 111 – Structure LR	74
Table D.1 – Structure of header	85
Table D.2 – Structure of ETFL.....	86
Table D.3 – Structure of thumbnail	86
Table D.4 – Structure of FMT	86
Table D.5 – DataType interpretation.....	87

INTRODUCTION

Broadcast data in a transport stream can contain multiple associated objects. When that data is distributed on interchangeable storage media, for example, optical disks, the associated objects should be synchronized. Open distribution of the media requires that the data be adapted to a standardized volume and file structure, which should conform to the existing basic volume and file structure.

MULTIMEDIA HOME SERVER SYSTEMS – INTERCHANGEABLE VOLUME/FILE STRUCTURE ADAPTATION FOR BROADCASTING RECEIVERS –

Part 2: General recording structure

1 Scope

This part of IEC 62328 defines the volume and file structure required for interchanging multimedia data of a home server/broadcasting receiver, which consists of an AV stream with multiple associated objects.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62328-1: *Multimedia home service systems – Interchangeable volume/file structure adaptation for broadcasting receivers – Part 1: General description and architecture*

IEC 62328-3: *Multimedia home service systems – Interchangeable volume/file structure adaptation for broadcasting receivers – Part 3: Broadcasting system specific recording structure – ISDB*

ISO/IEC 646:1991, *Information technology – ISO 7-bit coded character set for information interchange*

ISO/IEC 10918-1:1994, *Information technology – Digital compression and coding of continuous-tone still images: Requirements and guidelines*

ISO/IEC 13818-2:2000, *Information technology – Generic coding of moving pictures and associated audio information: Video*

3 Definitions

For the purposes of this document, the following terms and definitions apply.

3.1 action

duration from start to end defined by a user or equipment

3.2 AV stream

recorded data in the MainTS stream file of PROGxxxx.PIF in this specification or the general meaning as multiplexed digital audio and video

3.3 AV stream sequence

sequence of AV stream(s) pointed by the orderly set of pointers to the part of a MainTS stream file

3.4

component

elementary stream contained in a TV programme

3.5

event

set of video and/or audio stream data and/or related objects, which together form a broadcasting service in the duration defined by a broadcaster

3.6

partial TS

TS derived from broadcasting TS by modifying PSI/SI and/or removing one or more elementary streams

3.7

programme

recorded TV programme compliant with this specification

3.8

programme reference(PGR)

pointer which references all or a part of AV stream in a programme

3.9

programme reference group(PGRG)

set of programme references or a set of programme reference groups

3.10

transport stream(TS)

system stream for broadcasting defined in ISO/IEC13818-1

3.11

TV programme

logical unit of TV broadcasting (event in digital TV service)

3.12

TVRS partial TS

partial TS recording format which complies with this specification

4 Abbreviations

For the purposes of this document, the following abbreviations apply.

ACU	Access unit
ALU	Allocation unit
AES	Advanced encryption standard
ATSC	Advanced television systems committee
BP	Byte position within a file starting with zero
CBC	Cipher block chaining
CCI	Copy control information
CD	Compact disc
DVD	Digital versatile disc
DES	Data encryption standard
DSM-CC	Digital storage media command and control

DVB	Digital video broadcasting
ES	Elementary stream
GOP	Group of pictures
HDD	Hard disk drive
IRV	International reference version
ISDB	Integrated services digital broadcasting
MO	Magneto-optical disk
MPEG	Moving picture experts group
PES	Packetized elementary stream
PGR	Programme reference
PGRG	Programme reference group
PID	Packet identifier
PSI	Programme-specific information
RBP	Relative byte position within a file starting with zero
RP	Recording packet
SI	Service information
STB	Set top box
TS	Transport stream
TU	Time unit
TVRS	TV recording format specific
UDF	Universal disk format

5 Notation

5.1 Numerical values

5.1.1 Decimal notation

A decimal number is represented as decimal digits 0 to 9.

5.1.2 Hexadecimal notation

A hexadecimal number is represented as hexadecimal digits 0 to 9 and A to F prefixed by the symbol “0x”.

5.1.3 Binary notation

A binary number is represented as binary digits 0 to 1 suffixed by the symbol “b”.

5.1.4 Bit string

A bslbf shall be recorded as bit string, left bit first.

5.1.5 Unsigned numerical value

A uimbsf shall be unsigned integer, most significant bit first.

6 General

6.1 Generic timestamp (GTS)

The structure of GTS is described in Table 1.

Table 1 – Structure of GTS

RBP	Length in bytes	Field name	Contents
0	1	TYPE and time zone	TTZ
1	1	Extended information	EI
2	1	Year (from 1900)	uimsbf
3	1	Month	uimsbf
4	1	Day	uimsbf
5	1	Hour	uimsbf
6	1	Minutes	uimsbf
7	1	Seconds	uimsbf

6.1.1 Type and time zone (RBP0)

The structure of TTZ is described in Table 2.

Table 2 – Structure of TTZ

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
L/G	TZ P/M	TZ Offset[3..0]				HF	DSTF

6.1.1.1 L/G (bit7) [bslbf]

If the local time is applied, the L/G bit shall be set to 1b. If the coordinated universal time (global time) is applied, the L/G bit shall be 0b.

6.1.1.2 TZ P/M (bit6) [bslbf]

If the local time is ahead of the coordinated universal time, the TZ P/M bit shall be set to 1b. If the local time is behind the coordinated universal time, the TZ P/M bit shall be 0b. If the L/G bit is 0b, this means that the coordinated universal time is applied – this bit shall be ignored.

6.1.1.3 TZ offset [3..0] (bit5-2) [uimsbf]

This 4-bit value specifies the offset, in hours, of the date and time of the day from the coordinated universal time. This offset is an absolute value.

6.1.1.4 HF (bit1) [bslbf]

If this HF bit is set to 1b, the TZ offset has a half-hour additional time. If this HF bit is set to 0b, the TZ offset has no additional time.

6.1.1.5 DSTF (bit0) [bslbf]

If this DSTF bit is set to 1b, the daylight saving time is applied by the time zone. If this DSTF bit is set to 0b, the standard time is applied by the time zone.

6.1.2 Extended information (RBP1)

The structure of EI is described in Table 3.

Table 3 – Structure of EI

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Day of week[2..0]				Reserved			

6.1.2.1 Day of week [2..0] (bit7-5) [uimsbf]

The day of the week is stored. The 3-bit interpretation is described in Table 4.

Table 4 – Day-of-week interpretation

Value	Interpretation
0x0	The day of week is not specified in this field
0x1	Sunday
0x2	Monday
0x3	Tuesday
0x4	Wednesday
0x5	Thursday
0x6	Friday
0x7	Saturday

6.1.2.2 Reserved (bit4-0) [bslbf]

These bits are reserved for future standardization and all bits shall be set to 0b.

6.1.3 Year (RBP2)

This field shall specify the year as an offset value from 1900.

6.1.4 Month (RBP3)

This field shall specify the month of the year as a number in the range 1 to 12.

6.1.5 Day (RBP4)

This field shall specify the day of the month as a number in the range 1 to 31.

6.1.6 Hour (RBP5)

This field shall specify the hour of the day as a number in the range 0 to 23.

6.1.7 Minute (RBP6)

This field shall specify the minute of the hour as a number in the range 0 to 59.

6.1.8 Second (RBP7)

This field shall specify the second of the minute as a number in the range 0 to 59.

6.2 Timestamp on AV stream (TSAVS)

The structure of TSAVS is described in Table 5.

Table 5 – Structure of TSAVS

RBP	Length in bytes	Field name	Contents
0	4	AV stream timestamp	AVTS

6.2.1 AV stream timestamp (RBP0)

The structure of AVTS is described in Table 6.

Table 6 – Structure of AVTS

bit31	bit30	bit29	bit28	bit27	bit26	bit25	bit24
Frame_Rate[3..0]				Number of frames[27..24]			
bit23	bit22	bit21	bit20	bit19	bit18	bit17	bit16
Number of frames[23..16]							
bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8
Number of frames[15..8]							
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Number of frames[7..0]							

6.2.1.1 Frame rate[3..0] (bit31-28) [uimbsf]

The frame rate of the pointed AV stream is stored. The 4-bit interpretation is described in Table 7.

Table 7 – Frame rate interpretation

Value	Interpretation
0x0	Frame rate is NOT specified in this field
0x1	24/1,001 (23,976)Hz
0x2	24 Hz
0x3	25 Hz
0x4	30/1,001 (29,97)Hz
0x5	30
0x6	50
0x7	60/1,001 (59,94)Hz
0x8	60
0x9 - 0xF	Reserved

6.2.1.2 Number of frames [27..0] (bit27-0) [uimsbf]

This 27-bit value specifies the number of frames from the beginning of pointed AV stream.

6.3 Duration

The structure duration is described in Table 8.

Table 8 – Structure duration

RBP	Length in bytes	Field name	Contents
0	1	Day	uimsbf
1	1	Hour	uimsbf
2	1	Minutes	uimsbf
3	1	Seconds	uimsbf

6.3.1 Day (RBP0)

This field shall specify the day as a number in the range 0 to 255.

6.3.2 Hour (RBP1)

This field shall specify the hour of the day as a number in the range 0 to 23.

6.3.3 Minute (RBP2)

This field shall specify the minute of the hour as a number in the range 0 to 59.

6.3.4 Second (RBP3)

This field shall specify the second of the minute as a number in the range 0 to 59.

6.4 Dstring[n]

A Dstring[n] is a field where a string can be recorded. “n” in Dstring[n] is the unsigned integer and shall be the same as the value of character string field size. The character string field size shall be equal to n. The character set of the string is defined in the character set field. The structure of Dstring[n] is described in Table 9.

Table 9 – Structure of Dstring[n]

RBP	Length in bytes	Field name	Contents
0	1	Character set	uimsbf
1	3	Reserved	bslbf
4	2	Character string field size	uimsbf
6	2	Length of character string	uimsbf
8	n	Character strings	bslbf

6.4.1 Character set

The format of the character set is described in Table 10.

Table 10 – Interpretation of character set

Value	Character set
0x00-0xFF	The interpretation is specified in IEC 62328-3

6.4.2 Reserved

This field shall be reserved for future standardization and all bytes shall be set to 0x00.

6.4.3 Character string field size

Character string field size in bytes shall be stored in this field.

6.4.4 Length of character string

The length of character string in bytes shall be stored in this field.

6.4.5 Character strings

Character strings coded by the character set defined in character set field are stored.

6.5 Generic pointer position format

The structure of GPPF is described in Table 11.

Table 11 – Structure of GPPF

RBP	Length in bytes	Field name	Contents
0	4	Base position	BASEP
4	2	Offset position	uimsbf

6.5.1.1 Base position

The structure of BASEP is described in Table 12.

Table 12 – Structure of BASEP

bit31	bit30	bit29	bit28	bit27	bit26	bit25	bit24
Block_Length[2..0]				Number of blocks[28..24]			
bit23	bit22	bit21	bit20	bit19	bit18	bit17	bit16
Number of blocks[23..16]							
bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8
Number of blocks[15..8]							
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Number of blocks[7..0]							

6.5.1.1.1 Block_Length [2..0] (bit31-29) [uimbsf]

The length of the block is stored. The 3-bit interpretation is described in Table 13.

Table 13 – Block_Length interpretation

Value	Interpretation
0x0	The block length is 1 byte
0x1	The block length is 192 bytes (size of RP packet)
0x2	The block length is 512 bytes (size of sector)
0x3	The block length is 2048 bytes (size of sector)
0x4	The block length is 6144 bytes (size of aligned unit)
0x5-0x7	Reserved

6.5.1.1.2 Num_of_Blocks [28..0] (bit28-0) [uimbsf]

The base position based on the block defined in the Block_Length field shall be stored. The base position in bytes equals the block length defined in the Block_Length field multiplied by the value of the Num_of_Blocks field.

6.5.1.2 Offset position

Offset bytes from the base position shall be stored.

6.6 Generic thumbnail pointer format

6.6.1 Long generic thumbnail pointer format

The structure of LGTPF is defined in Table 14.

Table 14 – Structure of LGTPF

RBP	Length in bytes	Field Name	Contents
0	1	Thumbnail type	TTYPE
1	1	Thumbnail compression type	uimbsf
2	2	Thumbnail horizontal size	uimbsf
4	2	Thumbnail vertical size	uimbsf
6	136	Thumbnail pointer location	Dstring[128]
142	6	Thumbnail pointer position	GPPF
148	4	Thumbnail pointer size	uimbsf
152	136	Thumbnail file location	Dstring[128]
288	8	File offset of target thumbnail	uimbsf
296	4	Length of target thumbnail	uimbsf

6.6.1.1 Thumbnail type (TTYPE)

The structure of TTYPE is described in Table 15.

Table 15 – Structure of TTYPE

Bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
V	NC	L/S	P/EF	Reserved			

6.6.1.1.1 V (bit7) [bslbf]

If the thumbnail is defined by either the pointer to an AV stream file or an external file, the V bit shall be set to 1b. If the thumbnail is not indicated, the V bit shall be set to 0b.

6.6.1.1.2 NC (bit6) [bslbf]

If a change of the thumbnail is prohibited by a user or the equipment, the NC bit shall be set to 1b. Otherwise, the NC bit shall be 0b.

6.6.1.1.3 L/S (bit5) [bslbf]

If the thumbnail format is the long generic thumbnail pointer format, this bit shall be set to 1b. If the thumbnail format is the short generic thumbnail pointer format, this bit shall be set to 0b.

6.6.1.1.4 P/EF (bit 4) [bslbf]

If the thumbnail is defined by the pointer to an AV stream file, the P/EF bit shall be set to 1b. If the thumbnail is stored by the part of an external file, the P/EF bit shall be set to 0b.

6.6.1.1.5 Reserved (bit 3-0) [bslbf]

These bits are reserved for future use and shall be 0b.

6.6.1.2 Thumbnail compression type

The interpretation of the thumbnail compression type is described in Table 16. This field is valid only when the thumbnail is indicated by an external file.

Table 16 – Thumbnail compression type interpretation

Thumbnail compression type	Interpretation
0x0	The thumbnail compression type is not specified in this field
0x1	ISO/IEC 10918-1(JPEG)
0x2	MPEG2-I (video ES prefixed by a sequence header)
0x3 - 0xFF	Reserved

6.6.1.3 Thumbnail horizontal size

The number of the horizontal pixels of the thumbnail shall be stored. This is not a display size but a size of the stored thumbnail.

6.6.1.4 Thumbnail vertical size

The number of the vertical pixels of the thumbnail shall be stored. This is not a display size but a size of the stored thumbnail.

6.6.1.5 Thumbnail pointer location

If the thumbnail is defined by the pointer to an AV stream file, the location of an AV stream file shall be stored in this field. The location identification rule described in 7.3 shall be applied. If the P/EF bit in the thumbnail type field is 0b, this field shall be ignored.

6.6.1.6 Thumbnail pointer position

If the thumbnail is defined by the pointer to an AV stream file, the start position of an AV stream file shall be stored in this field. The start point of an AV stream described in Annex C should be referred. If the P/EF bit in the thumbnail type field is 0b, this field shall be ignored.

6.6.1.7 Thumbnail pointer size

If the thumbnail is defined by the pointer to an AV stream file, the size in bytes shall be stored in this field. The size of an AV stream described in Annex C should be referred. If the P/EF bit in the thumbnail type field is 0b, this field shall be ignored.

6.6.1.8 Thumbnail file location

If the thumbnail is stored in an external file, the location of an external file shall be stored in this field. The location identification rule described in 7.3 shall be applied. If the P/EF bit in the thumbnail type field is 1b, this field shall be ignored. The example of an external thumbnail file format is described in Annex D.

6.6.1.9 File offset of target thumbnail

If the thumbnail is stored in an external file, the start position in bytes of an external file shall be stored in this field. If the P/EF bit in the thumbnail type field is 1b, this field shall be ignored.

6.6.1.10 Length of target thumbnail

If the thumbnail is stored by the part of an external file, the length in bytes shall be stored in this field. If the P/EF bit in the thumbnail type field is 1b, this field shall be ignored.

6.6.2 Short generic thumbnail pointer format (SGTPF)

The structure of SGTPF is defined in Table 17.

Table 17 – Structure of SGTPF

RBP	Length in bytes	Field name	Contents
0	1	Thumbnail type	TTYPE
1	1	Thumbnail compression type	uimsbf
2	2	Thumbnail horizontal size	uimsbf
4	2	Thumbnail vertical size	uimsbf
6	6	Thumbnail pointer position	GPPF
12	4	Thumbnail pointer size	uimsbf
16	8	File offset of target thumbnail	uimsbf
24	4	Length of target thumbnail	uimsbf

6.6.2.1 Thumbnail type

The interpretation of this field is described in 6.6.1.1.

6.6.2.2 Thumbnail compression type

The interpretation of this field is described in 6.6.1.2.

6.6.2.3 Thumbnail horizontal size

The interpretation of this field is described in 6.6.1.3.

6.6.2.4 Thumbnail vertical size

The interpretation of this field is described in 6.6.1.4.

6.6.2.5 Thumbnail pointer position

The interpretation of this field is described in 6.6.1.6.

6.6.2.6 Thumbnail pointer size

The interpretation of this field is described in 6.6.1.7.

6.6.2.7 File offset of target thumbnail

The interpretation of this field is described in 6.6.1.9.

6.6.2.8 Length of target thumbnail

The interpretation of this field is described in 6.6.1.10.

6.7 Mark entry format

6.7.1 Long mark entry format (LMEF)

The structure of LMEF is defined in Table 18.

Table 18 – Structure of LMEF

RBP	Length in bytes	Field Name	Contents
0	1	Mark type	uimsbf
1	1	Flag	FLMEF
2	4	Element ID	uimsbf
6	4	Mark time	TSAVS or uimsbf
10	136	AV stream location	Dstring[128]
146	6	Mark position	GPPF
152	2	Offset time	uimsbf
154	2	PID	PIDPLUS
156	2	Reserved	bslbf
158	28	Mark representative thumbnail	SGTPF
186	136	Thumbnail file location	Dstring[128]
322	8	Mark placed timestamp	GTS
330	2	Reserved	bslbf

6.7.1.1 Mark type

The interpretation of the mark type is described in Table 19.

Table 19 – Mark type interpretation

Mark type	Interpretation
0x0	Shall mean that this field has no meaning.
0x1	Resume mark
0x2	Book mark
0x3 - 0xFF	Reserved

6.7.1.2 Flag

The structure of FLMEF is described in Table 20.

Table 20 – Structure of FLMEF

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
V	Reserved	IDTP	PIDV	Reserved	TS/F	PV	MTV

6.7.1.2.1 V (bit7) [bslbf]

If the mark structure is valid, the V bit shall be set to 1b. If the mark structure is invalid, the V bit shall be set to 0b.

6.7.1.2.2 Reserved (bit6)

These bits are reserved for the future use and shall be 0b.

6.7.1.2.3 IDTP (bit5) [bslbf]

If the ID referred by element ID field means PGR ID, the IDTP bit shall be set to 1b. If the ID referred by element ID field means PGRG ID, the IDTP bit shall be set to 0b.

6.7.1.2.4 PIDV (bit4) [bslbf]

If the selected PID value is stored in the PID field, the PIDV bit shall be set to 1b. Otherwise, the PIDV bit shall be 0b.

6.7.1.2.5 Reserved (bit3) [bslbf]

These bits are reserved for future use and shall be 0b.

6.7.1.2.6 TS/F (bit2) [bslbf]

If this bit is 1b, the timestamp is selected to count time in the mark time field and the offset time field. If this bit is 0b, the number of frames is selected to count time in the mark time field and the offset time field.

6.7.1.2.7 PV (bit1) [bslbf]

If the mark is defined by the pointer to an AV stream file, the PV bit shall be set to 1b. Otherwise, the PV bit shall be 0b.

6.7.1.2.8 MTV (bit0) [bslbf]

If the mark time field is valid, the MTV bit shall be set to 1b. If the mark time field is invalid, the MTV bit shall be 0b.

6.7.1.3 Element ID

The element ID to which the mark belongs is stored. The element ID is either PGR_ID or PGRG_ID. This depends on the IDTP bit in the flag field.

6.7.1.4 Mark time

If the MTV bit in the flag field is 1b, the mark time of AV stream sequence shall be stored. If the TS/F bit in the flag field is 1b, the contents of this field shall be "TSAVS". If the TS/F bit in the Flag field is 0b, the contents of this field shall be "uimbsf" and the value, which represents the time from the beginning of the AV stream sequence, is counted by 45 000 Hz. If the MTV bit in the flag field is 0b, this field shall be ignored.

6.7.1.5 AV stream location

The location of the AV stream where the mark is placed may be stored. The location identification rule described in 7.3 shall be applied. If the PV bit in the flag field is 0b, this field shall be ignored.

6.7.1.6 Mark position

The mark position from the beginning of the AV stream file shall be stored. The start point of the AV stream described in Annex C should be referred. If the PV bit in the flag field is 0b, this field shall be ignored.

6.7.1.7 Offset time

If the TS/F bit in the flag field is 0b, the offset number of frames from the pointed by mark position field is stored. The start point of the AV stream described in Annex C should be referred. If the TS/F bit in the flag field is 1b, the offset time counted by 45 000 Hz shall be stored. If the PV bit in the flag field is 0b, this field shall be ignored.

6.7.1.8 PID

If the PIDV bit in the flag field is 1b, the PID and the PID type shall be stored. The format of this field, which is the structure PIDPLUS, is specified in Table 21. If the PIDV bit is 0b, this field shall be ignored.

Table 21 – Structure of PIDPLUS

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8
PID_Type[2..0]				PID[12..8]			
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
PID[7..0]							

6.7.1.8.1 PID_Type [2..0] (bit15-13) [uimbsf]

The type of PID shall be stored. The 3-bit interpretation is described in Table 22.

Table 22 – PID_Type interpretation

PID_Type	Interpretation
0x0	Shall mean that the type of PID is not specified
0x1	Video PID
0x2 – 0x7	Reserved

6.7.1.8.2 PID[12..0](bit12-0)[uimsbf]

The PID value shall be stored.

6.7.1.9 Reserved

This field shall be reserved for future standardization and all bytes shall be set to 0x00.

6.7.1.10 Mark representative thumbnail

The mark representative thumbnail may be stored. The structure of SGTPF is described in Table 17. If the MTNV bit in the Flag field is 0b, this field shall be ignored.

6.7.1.11 Thumbnail file location

If the thumbnail is stored by the part of an external file, the location of an external file shall be stored in this field. The location identification rule described in 7.3 shall be applied. If the P/EF bit in the thumbnail type field in mark representative thumbnail structure is 1b or the V bit in thumbnail type field in the mark representative thumbnail structure is 0b, this field shall be ignored.

6.7.1.12 Mark-placed timestamp

The timestamp in which the mark is placed is stored.

6.7.1.13 Reserved

This field shall be reserved for future standardization and all bytes shall be set to 0x00.

6.7.2 Short mark entry format (SMEF)

The structure of SMEF is defined in Table 23.

Table 23 – Structure of SMEF

RBP	Length in bytes	Field name	Contents
0	1	Mark type	uimsbf
1	1	Flag	bslbf
2	4	ID element	uimsbf
6	4	Mark time	TSAVS or uimsbf
10	6	Mark position	GPPF
16	2	Offset time	uimsbf
18	2	PID	uimsbf
20	2	Reserved	uimsbf
22	28	Mark representative thumbnail	SGTPF
50	8	Mark-placed timestamp	GTS
58	2	Reserved	bslbf

6.7.2.1 Mark type

The interpretation of this field is described in 6.7.1.1.

6.7.2.2 Flag

The interpretation of this field is described in 6.7.1.2.

6.7.2.3 Element ID

The interpretation of this field is described in 6.7.1.3.

6.7.2.4 Mark time

The interpretation of this field is described in 6.7.1.4.

6.7.2.5 Mark position

The interpretation of this field is described in 6.7.1.6.

6.7.2.6 Number of offset frames

The interpretation of this field is described in 6.7.1.7.

6.7.2.7 PID

The interpretation of this field is described in 6.7.1.8.

6.7.2.8 Reserved

This field shall be reserved for future standardization and all bytes shall be set to 0x00.

6.7.2.9 Mark representative thumbnail

The interpretation of this field is described in 6.7.1.10.

6.7.2.10 Mark-placed timestamp

The interpretation of this field is described in 6.7.1.11.

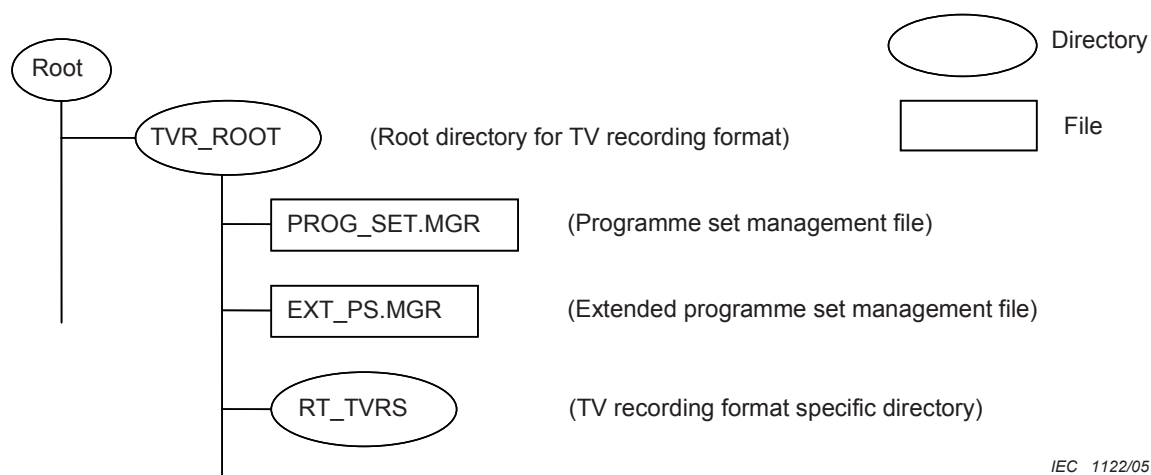
6.7.2.11 Reserved

This field shall be reserved for future standardization and all bytes shall be set to 0x00.

7 File and directory

7.1 Composition of directories

A secure UDF format is used as the file system. The file structure is shown in Figure 1. The TVR_ROOT directory is the root directory of the TV recording format described in this specification. The PROG_SET.MGR file manages all recorded programmes. The EXT_PS.MGR file contains additional information related to recorded programmes. The RT_TVRS directory is the root directory for programmes stored by TV recording specific format.



IEC 1122/05

Figure 1 – File structure**7.1.1 Structure of programme reference (PGR)**

The structure of PGR (Version1.0) has the fields described in Table 24.

Table 24 – Structure of PGR

RBP	Length in bytes	Field name	Contents
0	3	PGR identifier	bslbf
3	1	Reserved	bslbf
4	1	PGR version	VER
5	1	Reserved	bslbf
6	2	Length of PGR structure	uimbsf
8	4	PGR ID	uimbsf
12	1	PGR type	PGRTYPE
13	1	Content type	uimbsf
14	2	Reserved	bslbf
16	8	PGR created time	GTS
24	4	Reserved	bslbf
28	8	PGR last accessed time	GTS
36	4	Reserved	bslbf
40	48	Programme reference name	Dstring[40]
88	4	Link count	uimbsf
92	136	Recorded programme location	Dstring[128]
228	6	Start position	GPPF
234	2	Offset time	uimbsf
236	4	Reference start time	TSavs
240	4	Reference duration	uimbsf
244	28	PGR representative thumbnail	SGTPF
272	136	Thumbnail file location	Dstring[128]
408	2	Number of total marks	uimbsf
410	1	Number of marks in PGR	uimbsf
411	1	Reserved	bslbf

412	60	Mark(1)	SMEF
472	60	Mark(2)	SMEF
532	60	Mark(3)	SMEF
592	60	Mark(4)	SMEF
652	60	Mark(5)	SMEF
712	32	Each PGR specific area	PGRSA

7.1.1.1 PGR identifier

This field shall contain “PGR” coded by ISO/IEC 646 IRV.

7.1.1.2 Reserved

This field shall be reserved for future standardization and all bytes shall be set to 0x00.

7.1.1.3 PGR version

This field shall be 0x10. It means the PGR structure is Version1.0. The structure of VER is described in Table 25.

Table 25 – Structure of VER

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Major version				Minor version			

7.1.1.3.1 Major version (bit7-4) [uimsbf]

The major version of PGR shall be stored.

7.1.1.3.2 Minor version (bit3-0) [uimsbf]

The minor version of PGR shall be stored.

7.1.1.4 Reserved

This field shall be reserved for future standardization and all bytes shall be set to 0x00.

7.1.1.5 Length of PGR structure

This field describes the length of the PGR structure. This field shall be set to 744 in the case of Version1.0.

7.1.1.6 PGR ID

The unique PGR ID shall be written.

7.1.1.7 PGR type

The structure of PGRTYPE is described in Table 26.

Table 26 – Structure of PGRTYPE

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
V	Reserved				TS/F		Part

7.1.1.7.1 V (bit7)[bslbf]

If the PGR structure is valid, the V bit shall be set to 1b. If the PGR structure is invalid, the V bit shall be set to 0b.

7.1.1.7.2 Reserved (bit6-2) [bslbf]

These bits are reserved for future use and shall be 0b.

7.1.1.7.3 TS/F (bit1) [bslbf]

If this bit is 1b, the timestamp is selected to count time in the offset time field, the reference start time, and the reference duration field. If this bit is 0b, the number of frames is selected to count time in the offset time field and the reference duration field.

7.1.1.7.4 Part (bit0)

If part of the programme is referred by PGR, the part bit shall be one. If the whole of the programme is referred by PGR, the part bit shall be 0b.

7.1.1.8 Content type

If the programme is stored in the TVRS directory, the value of this field shall be copied from the programme identification type in the programme general information.

7.1.1.9 Reserved

This field shall be reserved for future standardization and all bytes shall be set to 0x00.

7.1.1.10 PGR created time

The PGR created time is stored.

7.1.1.11 Reserved

This field shall be reserved for future standardization and all bytes shall be set to 0x00.

7.1.1.12 PGR last accessed time

The last accessed time of the PGR is stored.

7.1.1.13 Reserved

This field shall be reserved for future standardization and all bytes shall be set to 0x00.

7.1.1.14 Programme reference name

The programme reference name field is used to describe the name of the PGR. The naming rule is not specified here.

7.1.1.15 Link count

The number of PGRG links shall be written.

7.1.1.16 Recorded programme location

The location of the programme file referenced by this PGR shall be stored. The location identification rule is described in 7.3.