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ITU-R

Radiocommunication Sector of ITU

Recommendation ITU-R BT.1614-1

(01/2012)

Payload identification data structure for digital television interfaces

BT Series

Broadcasting service (television)

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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.1614-1

Payload identification data structure for digital television interfaces

(Question ITU-R 130/6)

(2003-2012)

Scope

The payload identification packet is intended to be inserted into the interface(s) carrying digital images, digital audio, and other ancillary data. Where multiple interfaces are used to carry data exceeding the bandwidth of one link the identification packet is used to identify the individual links. The identification packet may be used to provide receivers with information concerning the payload being received.

The ITU Radiocommunication Assembly,

considering

a) that many countries have installed digital television production facilities based on the use of digital video components conforming to Recommendations ITU-R BT.601, ITU-R BT.656, ITU-R BT.709 and ITU-R BT.799;

b) that high definition television (HDTV) production systems are being installed based on digital HDTV interfaces conforming to Recommendation ITU-R BT.1120;

c) that there are operational and economic benefits if a single infrastructure is used to carry a variety of source formats;

d) that it is necessary to identify the payloads carried over an interface that may be used for a variety of source formats;

e) that multiple links may be used to accommodate bandwidth requirements beyond those that can be carried by the single link interface of Recommendation ITU-R BT.1120,

recommends

1 that the payload identification described in Annex 1 should be used;

2 that Note 1 is considered as part of the Recommendation.

NOTE 1 – Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., 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.

Annex 1

Normative Reference

Recommendation ITU-R BT.1364 “Format of ancillary data signals carried in digital component studio interface”.

1 General[1]

This Recommendation defines a metadata payload identifier data structure that may be added to digital television interfaces for the purpose of identifying the interface payload. The payload identifier is intended for application to all existing and future digital television interfaces. The identifier shall have a data structure type 2 as defined in Recommendation ITU-R BT.1364, constrained to 10-bit interfaces only.

The payload identifier shall be used to identify the video, audio, and ancillary data payload carried on a digital interface transport.

The payload identifier shall be 4 bytes long where each byte has a separate significance. The first byte of the payload identifier shall have the highest significance and subsequent bytes shall be used to define lower order payload information.

Once assigned, byte 1 values cannot be re-purposed if the specific payload identification code is deprecated in the future.

1.1 Payload data structure

The ancillary data packet used by the payload identifier shall use the Type 2 data identification having first data identification (DID) word followed by secondary data identification (SDID) word.

The DID word shall be set to the value 41h. The SDID word shall be set to the value of 01h.

Table 1 outlines the ancillary data packet words with values where appropriate. The total size of the ancillary data packet is 11 words.

TABLE 1

Ancillary data packet structure for the payload identifier

Name	Acronym	Value
Ancillary data flag (10-bit words)	ADF	000h, 3FFh, 3FFh
Data identification	DID	41h
Secondary data identification	SDID	01h
Data count	DC	04h
SDI video payload identifier	4 words	—
Checksum	CS	—

[1] Use of payload identifiers conforming to Recommendation ITU-R BT.1614 (2003) are deprecated.

2 General payload identifier format

Table 2 shows the overall structure of the payload identifier. This payload identifier can only be used with 10-bit interfaces.

The byte 1 value is mandatory and identifies the combination of payload format and digital interface transport. The values of the remaining 3 bytes are application specific. Default definitions for individual fields are defined in Table 3, and subsequent sections of this Recommendation.

The precise definition and use of all payload identifiers defined prior to 2011 is deprecated.

TABLE 2

Generalized payload identifier byte definitions for digital transports

Bits	Byte 1	Byte 2	Byte 3	Byte 4
Bit 7	Version identifier	Application specific	Application specific	Application specific
Bit 6	Payload and digital interface Recommendations (mandatory)			
Bit 5				
Bit 4				
Bit 3				
Bit 2				
Bit 1				
Bit 0				

TABLE 3

Suggested default payload identifier field definitions (Informative)

Bits	Byte 2	Byte 3	Byte 4
Bit 7	Interlaced (0) or progressive (1) transport	Image aspect ratio 4:3 (0) or 16:9 (1)	Channel assignment Single-link or ch1 of multi-channel (0h), ch2 of multi-channel (1h), ch3 of multi-channel (2h), ch4 of multi-channel (3h), ch5 of multi-channel (4h), ch6 of multi-channel (5h), ch7 of multi-channel (6h) ch8 of multi-channel (7h)
Bit 6	Interlaced (0) or progressive (1) picture	Reserved	
Bit 5	Reserved	Reserved	
Bit 4	Reserved	Reserved	Reserved
Bit 3	Picture rate	Sampling structure identification	Reserved
Bit 2			Reserved
Bit 1			Bit depth 8-bit (0h), 10-bit (1h) or 12-bit (2h), Reserved (3h)
Bit 0			

TABLE 4

Payload identifier ancillary packet format

	b9 (MSB)	**b8**	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**b0 (LSB)**
Ancillary data flag (ADF)	0	0	0	0	0	0	0	0	0	0
	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1
Data ID (DID)	not b8	EP	0	1	0	0	0	0	0	1
Secondary data ID (SDID)	not b8	EP	0	0	0	0	0	0	0	1
Data count (DC)	not b8	EP	0	0	0	0	0	1	0	0
Video payload (byte 1)	not b8	EP	Version ID	Payload identifier						
Picture rate and scanning (byte 2)	not b8	EP	Application defined values and parameters							
Sampling structure (byte 3)	not b8	EP								
Special options (byte 4)	not b8	EP								
Checksum	not b8	Sum of b0~b8 of DID through to payload byte 4.								

EP = even parity for b0 through b7.

3 Placement of the ancillary data packet

As this packet defines a basic payload type, the preferred horizontal placement of the ancillary data packet is immediately following an EAV-LN-CRC word sequence.

The line number of the packet will vary according to the digital video interface to meet with existing equipment practice. The preferred line numbers for different interfaces are summarized below.

Implementers should be aware that the preferred horizontal and vertical locations for the Payload Identification Code packets are recommendations only. The actual packet location may vary on a case-by-case basis. Decoder manufacturers shall not depend on the recommended location for the detection and extraction of the payload packet.

3.1 1 125-line digital interfaces, interlace and segmented frame

For digital interfaces having 1 125 lines with interlaced (I) and progressive segmented-frame (PsF) scanning structures, the ancillary data packet shall be added once per field on the Y-channel as

defined in Recommendation ITU-R BT.1120. The recommended location of the ancillary packet, if ancillary space is available, shall be on the following lines:

1 125I (field 1): Line 10

1 125I (field 2): Line 572.

NOTE – These line numbers also apply to Recommendation ITU-R BT.1120 dual-link HD-SDI when using interlaced and progressive segmented-frame scanning.

3.2 1 125-line digital interfaces, progressive frame

For digital interfaces having 1 125 lines with progressive scanning structures, the ancillary data packet shall be added once per frame on the Y-channel as defined in Recommendation ITU-R BT.1120. The recommended location of the ancillary packet, if ancillary space is available, shall be on the following lines:

1 125P: Line 10.

3.3 525- and 625-line digital interfaces, interlace

For digital interfaces having 525 or 625 lines with an interlaced (I) picture structure, the ancillary data packet shall be added once per field. The recommended location of the ancillary packet, if ancillary space is available, shall be on the following lines:

525I (field 1): Line 13;

525I (field 2): Line 276;

625I (field 1): Line 9;

625I (field 2): Line 322.

4 Default values

Reserved values shall be set to (0) unless otherwise specified in an application. This section is entirely informative.

4.1 Byte 2: Picture rate and scanning method

The second byte may be used to identify the picture rate and the picture and transport scanning methods.

Bit b7 may be used to identify whether the digital interface uses a progressive or interlaced transport structure such that:

b7 = 0 identifies an interlaced transport;

b7 = 1 identifies a progressive transport.

Bit b6 may be used to identify whether the picture has a progressive or interlace structure such that:

b6 = 0 identifies an interlaced structure;

b6 = 1 identifies a progressive structure.

NOTE – PsF video payloads are identified by a progressive image transported over an interlaced digital interface transport carrying the progressive image as a first and second picture segment within the transport frame duration. These first and second picture segments are indicated by the first and second field indicators in the digital interface transport.

Bits b5 to b4 may be set to 0, unless defined elsewhere for application specific uses.

Bits b3 to b0 may be used to identify the picture rate in Hz.

TABLE 5

Suggested default assignment of picture rate values (Informative)

Value	Picture rate	Value	Picture rate	Value	Picture rate	Value	Picture rate
0h	No defined value	1h	Reserved	2h	24/1.001	3h	24
4h	48/1.001	5h	25	6h	30/1.001	7h	30
8h	48	9h	50	Ah	60/1.001	Bh	60
Ch	Reserved	Dh	Reserved	Eh	Reserved	Fh	Reserved

4.2 Byte 3: Sampling structure identification

The third byte may be used to identify the aspect ratio and sampling structure of the video payload.

Bit b7 may be used to identify the image aspect ratio such that:

b7 = 0 indicates a 4:3 aspect ratio;

b7 = 1 indicates a 16:9 aspect ratio.

Bits b6 to b4 may be set to 0, unless defined elsewhere for application specific uses.

Bits b3 to b0 of byte 3 may be used to identify the horizontal sampling structure.

TABLE 6

Suggested default assignment of sampling structure values (Informative)

Value	Sampling	Value	Sampling	Value	Sampling	Value	Sampling
0h	4:2:2 ($Y/C_B/C_R$)	1h	4:4:4 ($Y/C_B/C_R$)	2h	4:4:4 (G/B/R)	3h	4:2:0
4h	4:2:2:4 ($Y/C_B/C_R$/A)	5h	4:4:4:4 ($Y/C_B/C_R$/A)	6h	4:4:4:4 (G/B/R/A)	7h	Reserved
8h	4:2:2:4 ($Y/C_B/C_R$/D)	9h	4:4:4:4 ($Y/C_B/C_R$/D)	Ah	4:4:4:4 (G/B/R/D)	Bh	Reserved
Ch	Reserved	Dh	Reserved	Eh	4:4:4 ($X'Y'Z'$)	Fh	Reserved

4.3 Byte 4: Special options

Byte 4 may be used to identify extended aspects of the payload appropriate to each application.

Bits b7, b6 and b5 may be used to identify channel identification information such that:

– 0h identifies a single channel video payload or channel 1 of a multi-channel video payload;
– 1h identifies channel 2 of a multi-channel video payload;
– 2h identifies channel 3 of a multi-channel video payload;
– 3h identifies channel 4 of a multi-channel video payload;
– 4h identifies channel 5 of a multi-channel video payload;
– 5h identifies channel 6 of a multi-channel video payload;
– 6h identifies channel 7 of a multi-channel video payload;
– 7h identifies channel 8 of a multi-channel video payload.

Bits b4 to b2 may be set to 0, unless defined elsewhere for application specific uses.

Bits b1 and b0 may be used to identify the bit depth of the sample quantization such that:

– 0h identifies quantization using 8 bits per sample;

– 1h identifies quantization using 10 bits per sample;

– 2h identifies quantization using 12 bits per sample.

In the case where the bit depth field indicates 12-bits per sample, it should be noted that these bits are mapped onto a 10-bit interface.

Appendix 1
(Informative)

Byte 1 Registration procedure

The Payload Identifier byte 1 value is assigned and registered by SMPTE RA. ITU-R Secretariat is requested to apply for byte 1 value(s) by sending a letter to the SMPTE Engineering VP requesting a Byte 1 value along with a copy of the relevant unapproved (PDNR-DNR) ITU-R Recommendation. SMPTE will assign a provisional byte 1 value following their verification that the application of the payload ID is correct. The provisional status of the byte 1 value assigned by SMPTE will remain in effect for nine months, after which the value may be reassigned. Permanent registration of the byte 1 value will be put into effect once ITU-R notifies the SMPTE Engineering VP that the relevant Recommendation is now approved. SMPTE RA will list the ITU-R registered byte1 value, and application, on the SMPTE RA web site http://www.smpte-ra.org/.

Should the ITU use a byte 1 value that may be used by another SDO for the same application the ITU-R should supply a copy of the relevant approved ITU-R Recommendation to the SMPTE Engineering VP requesting that the application be listed on the SMPTE RA website.

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