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Radiocommunication Sector of ITU

Recommendation ITU-R BT.1364-3 (10/2015)

Format of ancillary data signals carried in digital component studio 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.

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RECOMMENDATION ITU-R BT.1364-3

Format of ancillary data signals carried in digital component studio interfaces

(Question ITU-R 130/6)

(1998-2005-2010-2015)

Scope

This Recommendation defines the data structure for ancillary data signal that may be carried as part of the payload in serial digital interfaces as defined in Recommendations ITU-R BT.656, ITU-R BT.799, ITU-R BT.1120 and ITU-R BT.2077. Applications defining the content of the ancillary data packets are defined by other ITU Recommendations as listed in Attachment 4.

Keywords

Ancillary data, DID (Data Identifier), SDID (Secondary Data Identifier)

The ITU Radiocommunication Assembly,

considering

- a) that most digital television production facilities are based on the use of digital video components conforming to Recommendations ITU-R BT.601, ITU-R BT.709, and ITU-R BT.2020;
- b) that HDTV production systems are using digital interfaces based on interfaces conforming to Recommendation ITU-R BT.1120;
- c) that there exists the capacity within the serial digital interfaces conforming to Recommendations ITU-R BT.656, ITU-R BT.799, ITU-R BT.1120 and ITU-R BT.2077 for additional data signals to be multiplexed along with the video data;
- d) that there are operational and economic benefits to be achieved by the multiplexing of ancillary data signals within the serial digital interface;
- e) that the operational benefits are increased if a minimum of different formats are used for ancillary data signals;
- f) that many applications are already using ancillary data signals carried in the serial digital interface,

recommends

- 1 that the ancillary data signal format described in Annex 1 should be used;
- 2 that 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. The use of such words shall in no way be construed to imply partial or total compliance with this Recommendation.

Annex 1

Ancillary data signal format

1 General description of the ancillary data signal format

The format specified provides a mechanism for the transport of ancillary data signals through digital video component interfaces in the digital blanking portion of the digital video data signal. The ancillary data is carried in packets, each packet carrying its own identification. A packet comprises:

- a fixed preamble to enable an ancillary data packet to be detected;
- data identification to enable packets carrying a particular type of ancillary signal to be identified;
- a packet length indication;
- a continuity indication;
- the ancillary data, up to 255 words in each packet;
- a checksum to permit error detection.

Provision is made for ancillary data exceeding 255 words to be carried in two or more linked packets, not necessarily contiguous with each other.

A protocol is described which permits a number of different ancillary data packets to be carried within the space available in the digital blanking intervals of the digital component interface signal and allows for the insertion and deletion of ancillary data packets. The ancillary data packets may either be in horizontal ancillary data space, or vertical ancillary data space.

During a horizontal interval of every television line, the ancillary data space that is located between EAV and SAV markers is called horizontal ancillary data space (HANC space).

During a vertical interval of each frame, the ancillary data space located between SAV and EAV markers is called vertical ancillary data space (VANC space).

NOTE 1 – Attention is drawn to the existence of other ancillary data signals, such as digitized time code and checksum, for error detection and status information, which occupy specific locations in the digital line- and field-blanking areas. These locations should not be used for the insertion of further ancillary data signals. Attention is drawn to the fact that signal switching disturbances will affect certain parts on the field and line-blanking areas and these locations should also not be used for the insertion of ancillary data signals (see Attachment 3).

NOTE 2 – The integrity of a data path for ancillary signals through all equipment cannot be assumed.

NOTE 3 – To avoid confusion between 8-bit and 10-bit representations of word values, the eight most-significant bits are considered to be an integer part while the two additional bits, if present, are considered to be fractional parts.

For example, the bit pattern 10010001 would be expressed as 145_d or 91_h, whereas the pattern 1001000101 would be expressed as 145.25_d or 91.4_h.

Where no fractional part is shown, it can be assumed to have the binary value 00.

2 Legacy 8-bit considerations

The parallel and serial digital video component interfaces described in Recommendation ITU-R BT.656 are capable of passing 10-bit data words. Some legacy interfaces may only pass 8 bits.

The passage of a 10-bit signal through such an 8-bit equipment results in truncation and the loss of the two LSBs, while serializing an 8-bit signal for transmission through the 10-bit serial interface results in two additional bits – usually zeros – being appended to the signal data bits.

By taking the above considerations into account, provision is made for a limited number of applications in which ancillary data will not be corrupted by either truncation or setting the two LSBs to zero (see Attachment 1).

For digital HDTV interfaces conforming to Recommendation ITU-R BT.1120 and ITU-R BT.2077 only 10-bit operation is suggested for ancillary data signals. See Recommendation ITU-R BT.2077 part 2 for ANC data packet mapping.

3 Ancillary data packet format

3.1 Ancillary data packet types

Ancillary data packets are divided into Type 1 and Type 2, where Type 1 uses a single word for data identification and Type 2 uses two words for this purpose: this allows a wide range of identification values to be used.

A total of 189 data identification values are reserved for 8-bit applications, as described in § 3.4, whereas approximately 29 000 values are provided for 10-bit applications.

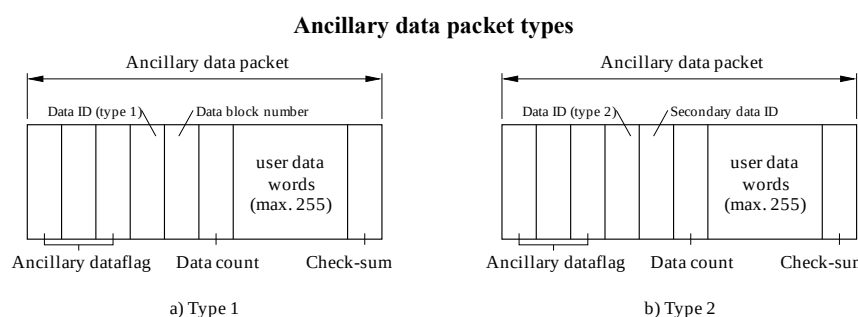
The two types are shown in Fig. 1.

The two types of data identification in the ancillary data packet format are specified below:

- *Type 1*: Uses a single word data identification, defined as data ID (DID), which is followed by data block number (DBN) and data count (DC).
- *Type 2*: Uses a two word data identification, defined as a combination of data ID (DID) and a secondary data ID (SDID) which is followed by a data count (DC).

Ancillary data is defined as 10-bit words. This is required by the structure of the signal format and its interface.

FIGURE 1



BT1364-01

3.1.1 Type 1 ancillary data packets

Ancillary data packets of Type 1 are composed of:

- an ancillary data flag (ADF) which marks the beginning of the ancillary data packet;
- a data ID (DID) which defines the nature of the data carried in the user data words of the ancillary data packet;
- a data block number (DBN) word for Type 1 only, which distinguishes successive ancillary data packets with a common data ID;

- a data count (DC) number which defines the quantity of user data words in the ancillary data packet;
- the user data words (UDW), maximum of 255 words in each ancillary data packet: the user data format is defined in a specific application text;
- a checksum (CS) word.

3.1.2 Type 2 ancillary data packets

Ancillary data packets of Type 2 are composed of the same elements as Type 1 ancillary data packets except for the DBN, which is replaced by a secondary data identification word (SDID).

3.2 Ancillary data flag

The ancillary data flag (ADF) consists of a three-word sequence having the values: 00.0_h FF.C_h FF.C_h.

NOTE 1 – To maximize compatibility between 8-bit and 10-bit equipment, it is recommended that data values of 00.0_h-00.C_h and FF.0_h-FF.C_h be processed identically. References in this Recommendation to specific data values in either of those two ranges should apply to all data values within the same range (see Attachment 1).

3.3 Data identification word

The data identification word (DID) consists of 10 bits, of which 8-bits carry the identification value, as shown in Table 1, and the remaining bits carry even parity and its inverse as shown:

- bits b7 (MSB)-b0 (LSB) form the identification value (00_h-FF_h);
- bit b8 is even parity for b7-b0;
- bit b9 = not b8.

DID words are divided into Type 1 and Type 2 categories. In general, the setting of bit b7=1 indicates Type 1 and b7=0 indicates Type 2 data identification. The exception to this categorization is word 00_h which identifies an undefined format (see § 3.4.1).

3.3.1 Reserved data identification words

DID words shown in Table 1 as “internationally registered” are for ancillary data packets of interest to most organizations and are registered with the standards-setting organizations listed in Attachment 2.

DID words shown as “user application” are not registered and are restricted to values in the range shown. They may be assigned by the user and/or by the manufacturer of the specified equipment.

DID words shown as “reserved for 8-bit applications” are restricted to three values in the range shown. Out of the values 04_h-0F_h reserved for 8-bit applications, the only valid values are 04_h, 08_h, and 0C_h. Other values in the reserved range would be truncated to these three values. DID words shown as “reserved” are reserved for future use.