

RECOMMENDATION ITU-R BT.1381-3*

Serial digital interface-based transport interface for compressed television signals and packetized data in networked television production based on Recommendation ITU-R BT.656**

(Question ITU-R 5/6)

(1998-2001-2006-2007)

Scope

This Recommendation specifies a data stream used to transport packetized data within a studio/production centre environment. The data packets and synchronizing signals are compatible with Recommendation ITU-R BT.656 (see Fig. 1).

The ITU Radiocommunication Assembly,

considering

- a) that the so-called serial digital interface (SDI) is in widespread use in television production studios and that it is documented in Recommendation ITU-R BT.656;
- b) that Recommendation ITU-R BR.1356 – User requirements for application of compression in television production, already exists;
- c) that maintaining video signals in compressed form as far as possible throughout the production and post-production process offers the potential of increased operating efficiency;
- d) that programme data composed of audio, compressed video, metadata and other packetized data should be streamed in a single or multiple container(s);
- e) that a transport mechanism must be established which allows point-to-point and point-to-multipoint routing of these data through a digital production and post-production chain;
- f) that the transport should allow synchronous data transfer to alleviate absolute and relative timing between programme data;
- g) that the transport mechanism should allow non-real time transfer of programme data,

recommends

- 1 that for applications based on the SDI infrastructure in networked production and post-production based on Recommendation ITU-R BT.656, the serial data transport interface (SDTI) described in Annex 1 should be used.

* This Recommendation should be brought to the attention of the International Electrotechnical Commission (IEC).

** Recommendation ITU-R BT.656-4 – Interfaces for digital component video signals in 525-line and 625-line television systems operating at the 4:2:2 level of Recommendation ITU-R BT.601

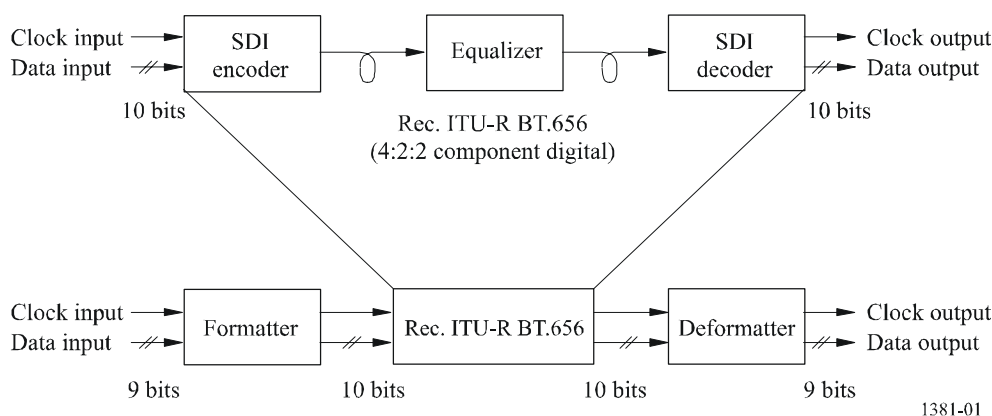
Annex 1

SDI-based transport interface for compressed television signals and packetized data in networked television production

1 Introduction

The carriage of packetized data utilizing the serial digital interface as defined by Recommendation ITU-R BT.656 is defined in this Recommendation. The formatting of the packetized data and the assigned values is covered by this Recommendation. Specific applications are covered by other Recommendations.

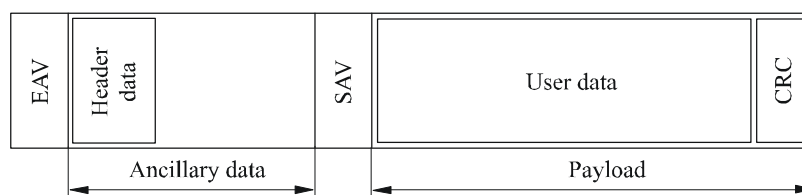
FIGURE 1
System block diagram



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1.1 Parameters of the protocol are compatible with the 4:2:2 component SDI format as shown in Fig. 2.

FIGURE 2
Signal format (1 line)



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1.2 The data stream is intended to transport any packetized data signal over the digital active lines that have a maximum data rate up to (approximately) 200 Mbit/s.

1.3 Additional texts will describe specific applications of this Recommendation and will include details of data formatting and other parameters, such as compression and error correction, if applicable.

2 Normative references

- Recommendation ITU-R BT.656 – Interface for digital component video signals in 525-line and 625-line television systems operating at the 4:2:2 level of Recommendation ITU-R BT.601.
- Recommendation ITU-R BT.1364 – Format of ancillary data signals carried in digital component studio interfaces.

3 General specifications

3.1 This Recommendation describes the assembly of a stream of 10-bit words. The resulting word stream should be serialized, scrambled, coded, and interfaced according to Recommendation ITU-R BT.656.

3.2 The word clock rate should be 27 MHz in accordance with Recommendation ITU-R BT.601.

3.3 The data word length should be 10 bits: B0 to B9. B9 is the most significant bit (MSB). The nominal data rate for the resulting serial data stream should be 270 Mbit/s.

3.4 The timing reference signals (EAV and SAV) occur on every line, and should be as described in Recommendation ITU-R BT.656.

3.5 An ANC data packet forming the header data is placed after EAV, as specified in § 4. All payload is placed between SAV and EAV. The space after the header data but before SAV is available for ANC data as specified by Recommendation ITU-R BT.1364.

3.6 The signal levels and specifications should be as described in Recommendation ITU-R BT.656.

3.7 The connector shall have mechanical characteristics conforming to the standard BNC type (IEC 61169-8 (2007-2)) – Part 8: Sectional specification RF coaxial connectors with inner diameter of outer conductor 6.5 mm (0.256 in) with bayonet lock-characteristic impedance 50 Ω (type BNC).

NOTE 1 – IEC 61169-8 (2007-2) is available in electronic version at the following address: <http://www.itu.int/md/R03-WP6A-C-0142/en>.

4 Header data

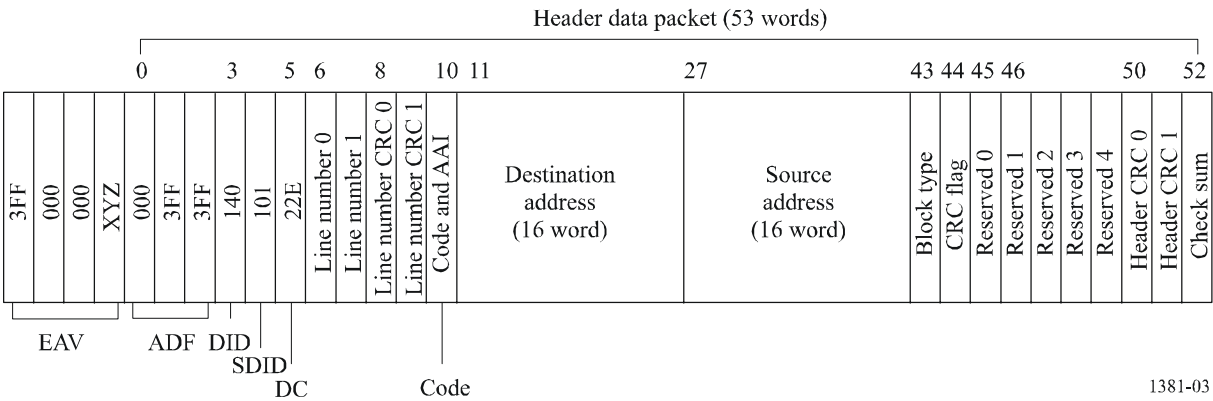
The data structure for the header data should conform to Recommendation ITU-R BT.1364 ancillary data packet (type 2). The header data should be located immediately after the EAV as shown in Fig. 3.



The header data should include the following:

- Line number [2 words]
- Line number CRC [2 words]
- Code and authorized address identifier (AAI) [1 word]
- Destination address [16 words]
- Source address [16 words]
- Block type [1 word]
- CRC flag [1 word]
- Reserved data [5 words]
- Header CRC [2 words]

FIGURE 3
Header data structure



4.1 Ancillary data formatting

The ADF, DID, SDID, DC, and CS should conform to Recommendation ITU-R BT.1364.

4.1.1 Data ID (DID)

The data ID should have the value of 40_h for B7 to B0.

- B8 is even parity for B7 to B0
- B9 is the complement of B8.

4.1.2 Secondary data ID (SDID)

The secondary data ID should have the value of 01_h for B7 to B0.

- B8 is even parity for B7 to B0
- B9 is the complement of B8.

4.1.3 Data count (DC)

The data count should represent 46 words for the header with the value 2E_h for B7 to B0.

- B8 is even parity for B7 to B0
- B9 is the complement of B8.

4.2 Line number

4.2.1 The line number should represent the number from 1 to 525 for 525-line systems, and 1 to 625 for 625-line systems in order to check the data continuity.

4.2.2 The line number should be contained within L9 to L0. R5 to R0 are reserved and set to zero (see Fig. 4).

- EP1 is even parity for L7 to L0
- EP2 is even parity for R5 to R0, L9, L8.

4.3 Line number CRC

Following each line number, a line number CRC should be inserted. The line number CRC applies to the data ID through the line number for the entire ten bits (see Fig. 5). The generator polynomial for the line number CRC should be $G(x) = x^{18} + x^5 + x^4 + 1$, which conforms to ITU-T Recommendation X.25 – Interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit (see Fig. 6).

Line number CRC should be contained in C17 to C0, and the initial value should be set to all ones.

4.4 Code and AAI

Both code and AAI should consist of four bits (see Fig. 7).

Code: B3 to B0

AAI: B7 to B4

- B8 is even parity for B7 to B0
- B9 is the complement of B8.

FIGURE 4
Line number

	0	1
B9	EP1	EP2
B8	EP1	EP2
B7	L7	R5
B6	L6	R4
B5	L5	R3
B4	L4	R2
B3	L3	R1
B2	L2	R0
B1	L1	L9
B0	L0	L8

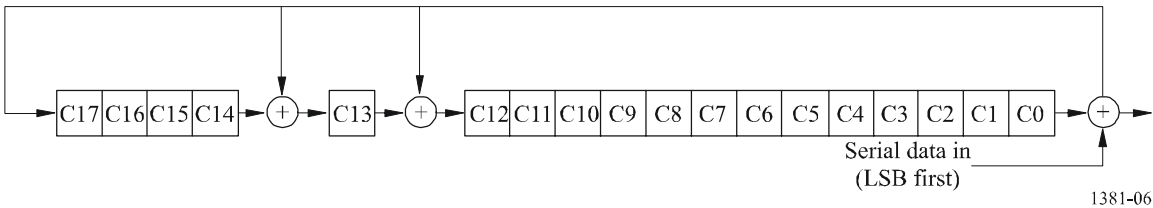
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FIGURE 5
Line number CRC

	0	1
B9	C8	C17
B8	C8	C17
B7	C7	C16
B6	C6	C15
B5	C5	C14
B4	C4	C13
B3	C3	C12
B2	C2	C11
B1	C1	C10
B0	C0	C9

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FIGURE 6
Generator polynomial



4.4.1 Code

The code is intended to identify the length of the payload with the following values. The payload should be contained in the area between SAV and EAV.

	B3	B2	B1	B0
Reserved for SDI:	0	0	0	0
1 440-word payload:	0	0	0	1

NOTE 1 – Code = “0000” is used where uncompressed 4:2:2 data are transmitted in the following line. However, uncompressed and compressed signals should not be mixed in the same signal.

Other codes should be registered with SMPTE (see § 7).

NOTE 2 – Code = “1000” is reserved for 143 Mbit/s applications.