

RECOMMENDATION ITU-R BT.1685

**Structure of inter-station control data
conveyed by ancillary data packets**

(Questions ITU-R 20/6 and 42/6)

(2004)

The ITU Radiocommunication Assembly,

considering

- a) that in broadcast station networks, various controls between broadcast stations have been performed using control signals multiplexed in the vertical blanking interval of analogue television signals;
- b) that many countries are installing digital television production, distribution and broadcasting facilities;
- c) that inter-station control data is also required for the distribution of digital television signals;
- d) that Recommendation ITU-R BT.1364 specifies the format of ancillary data signals carried in digital component studio interfaces conforming to Recommendations ITU-R BT.656 and ITU-R BT.1120;
- e) that some countries are already using the inter-station control data multiplexed as ancillary data signals,

recommends

- 1** that, for the transmission of inter-station control data as ancillary data signals conforming to Recommendation ITU-R BT.1364, the specification in Annex 1 should be used.

Annex 1**1 General items****1.1 Purpose**

The purpose of this Annex is to define the structure of inter-station control data which is conveyed using ancillary data packets within component bit-serial interface for standard-definition television systems and bit-serial interfaces for high-definition television systems, and the like, as used inside and outside studios at broadcast stations.

1.2 Scope

This Annex is applicable to devices which convey inter-station control data for digital broadcasting using ancillary data packets conforming to Recommendation ITU-R BT.1364.

1.3 Normative references

Some or all of the items defined in the following documents are referenced in this Annex.

- Recommendation ITU-R BT.1364 – Format of ancillary data signals carried in digital component studio interfaces.
- Recommendation ITU-R BT.1614 – Video payload identification for digital television interfaces.

1.4 Terminology

1.4.1 Definition of terminology

The terms used in this Annex are defined as follows:

Current video or audio mode:	The current video or audio mode.
Status bit:	A continuous signal, which is sent at appropriate intervals and indicates a condition.
Down-mix specification (or DM specification):	Conversion coefficient for signal processing when creating 2-channel stereo from multi-channel stereo with three front channels and two rear channels.
Trigger bit:	Intermittent signal or pulse used to provide control timing.
Next video or audio mode:	Video or audio mode, which is intended to be used next.
Net cue signal, broadcast-transmission-control signal:	Signal used for inter-station control and data transmission, which is inserted at the vertical blanking interval of television signals.
Frame synchronizer (FS):	i.e. equipment used for synchronizing non-synchronous television signals.
Frame skip:	The loss of one frame's worth of data.
Frame repeat:	The duplication of one frame's worth of data.
Ancillary data:	Various types of signal which are conveyed using the blanking interval for video signals within digital interfaces.

1.4.2 Abbreviations

The following abbreviations are used within this Annex.

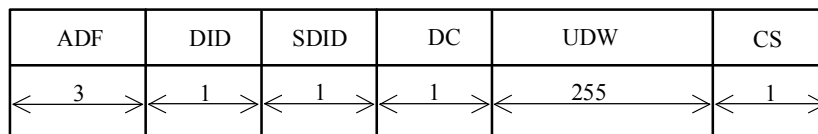
BCD:	binary coded decimal
BER:	bit-error rate
ECC:	error-correcting code
FS:	frame synchronizer
RS:	Reed Solomon

2 Inter-station control data packet

2.1 Inter-station control data packet format

Inter-station control data is conveyed using inter-station control data packets. The format of the inter-station control data packets shall conform to type 2 ancillary data packets as defined in Recommendation ITU-R BT.1364 and, in this format, one word consists of 10 bits. The format of inter-station control data packets is illustrated in Fig. 1.

FIGURE 1
Inter-station control data packet format



ADF: Ancillary data flag

DID: Data identification word. DID of inter-station control data packet shall be set to 143_h

SDID: Second data identification word. SDID of inter-station control data packet shall be set to 101_h

DC: Data count word

UDW: User data word

CS: Check sum word

Note 1: Numbers indicate the number of words. The same applies to Fig. 2 and Fig. 4.

Note 2: DID: 25F_h and SDID: 1FE_h in the range of “user application” are used in some countries.

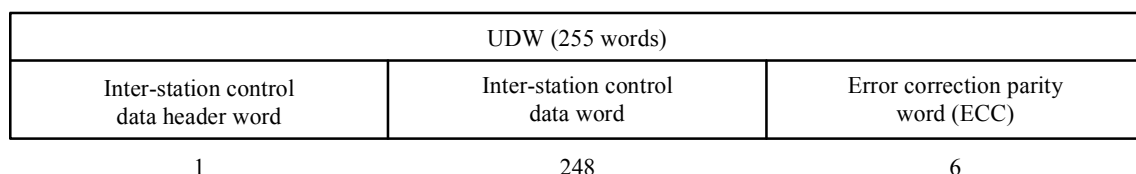
Note 3: The inter-station control data packet should preferably be placed in the vertical ancillary data space (VANC).

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2.2 User data word (UDW) format

Inter-station control data uses the UDW of the inter-station control data packet. The UDW comprises an inter-station control data word, an added inter-station control data header word and an error correction parity word (optional). The format of the UDW of an inter-station control data packet is illustrated in Fig. 2.

FIGURE 2
UDW format



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2.2.1 Inter-station control data header word

An inter-station control data header of a single word is placed at the front of the UDW. Bit assignment for the inter-station control data header word is illustrated in Table 1.

TABLE 1

Bit assignment for the inter-station control data header word

Bit number	Description
b9 (MSB)	Not b8
b8	Even parity for b0 through b7
b7	Error correction identifier
b6	Undefined ⁽¹⁾
b5	
b4	
b3	
b2	Continuity index (CI)
b1	
b0 (LSB)	

⁽¹⁾ Undefined bits shall be set to 0 (zero) until defined.

LSB: least significant bit.

MSB: most significant bit.

2.2.1.1 Error correction identifier

The error correction identifier indicates whether or not an error correction parity word is present. If set to 0 (no error correction), the last six words of the UDW shall not be used and shall be set to 200_h. If set to 1 (error correction), the last six words of the UDW constitute an error correction parity word. Code assignment for the error correction identifier is illustrated in Table 2.

TABLE 2

Error correction identifier

b7	Description
0	No error correction
1	Error correction

2.2.1.2 CI

The CI indicates the state of data packet continuity in the video field unit for interlaced scan systems, or in the video frame unit for progressive scan systems. The CI shall be increased by 1 for each packet by modulo 16.

2.2.2 Inter-station control data word

The lower 8 bits (b0 through b7) of the inter-station control data word constitute the inter-station control data. Bit assignment for the inter-station control data word is illustrated in Table 3.

TABLE 3
Bit assignment for the inter-station
control data word

Bit number	Description
b9 (MSB)	Not b8
b8	Even parity for b0 through b7
b7	Inter-station control data
b6	
b5	
b4	
b3	
b2	
b1	
b0 (LSB)	

2.2.2.1 Inter-station control data format

The format of inter-station control data is illustrated in Fig. 3.

FIGURE 3
Inter-station control data format

Bit number	Transmitting-station code	Transmitting-station time	Video mode			Audio mode			Trigger bits			
			Current video mode	Next video mode	Video mode countdown	Current DM mode	Next DM mode	Audio mode countdown	Q8	Q16	Q24	Q32
b7									Q8	Q16	Q24	Q32
b6									Q7	Q15	Q23	Q31
b5									Q6	Q14	Q22	Q30
b4									Q5	Q13	Q21	Q29
b3									Q4	Q12	Q20	Q28
b2									Q3	Q11	Q19	Q27
b1									Q2	Q10	Q18	Q26
b0									Q1	Q9	Q17	Q25
Words	8	9	4	4	1	1	1	1	1	1	1	1
Word number	1-8	9-17	18-21	22-25	26	27	28	29	30	31	32	33

Trigger counter				Trigger countdown				Status bits		Reserved area	Private area
Q1 counter	Q2 counter	Q3 counter	Q4 counter	Q1 countdown	Q2 countdown	Q3 countdown	Q4 countdown	S8	S16		
								S7	S15		
								S6	S14		
								S5	S13		
								S4	S12		
								S3	S11		
								S2	S10		
								S1	S9		
1	1	1	1	1	1	1	1	1	1	64	141
34	35	36	37	38	39	40	41	42	43	44-107	108-248

DM specification: Down-mix specification.

The following describes the format and implementation of each item of inter-station control data:

a) *Transmitting-station code (8 words)*

The transmitting-station code is used to provide display equipment with the name of the transmitting station. If no transmitting-station code is sent, all characters shall be spaces.

b) *Transmitting-station time (9 words)*

The transmitting-station time is used to provide information regarding the time at the transmitting station. Specifically, 4-bit BCD is used to encode the year, month, date, day, hour, minute, second, and millisecond. This encoding method is illustrated in Table 4.

TABLE 4
Coding of transmitting-station time

		Date section				Time section			ms section	
		Year	Month	Date	Day	Hour ⁽¹⁾	min	s	ms	
Word position		W0	W1	W2	W3	W4	W5	W6	W7	W8
Bit number	b7 (MSB)	Order of 10 (BCD)	←	←	0	Order of 10 (BCD)	←	←	0	Order of 10 (BCD)
	b6									
	b5									
	b4									
	b3	Order of 1 (BCD)	←	←	(2)	Order of 1 (BCD)	←	←	Order of 100 (BCD)	Order of 1 (BCD)
	b2									
	b1									
	b0 (LSB)									

⁽¹⁾ The 24-hour system is used.

⁽²⁾ Sunday (0_h), Monday (1_h), Tuesday (2_h), Wednesday (3_h), Thursday (4_h), Friday (5_h), and Saturday (6_h).

The lower 8 bits of unsent words shall be set to FF_h.

The following values are valid:

- Year: Decimal values from 0 to 99 (Further studies to convert this value to the four decimal format might be needed.)
- Month: Decimal values from 1 to 12
- Date: Decimal values from 1 to 31
- Day: Decimal values from 0 to 6
- Hour: Decimal values from 0 to 23
- Minute and second: Decimal values from 0 to 59
- Millisecond: Decimal values from 0 to 999.