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GENERAL ASPECTS OF DIGITAL TRANSMISSION SYSTEMS

TERMINAL EQUIPMENTS

GENERAL CHARACTERISTICS OF A 60-CHANNEL TRANSCODER EQUIPMENT

ITU-T Recommendation G.761

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation G.761 was published in Fascicle III.4 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2 In this Recommendation, the expression “Administration” is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation G.761

GENERAL CHARACTERISTICS OF A 60-CHANNEL TRANSCODER EQUIPMENT

(Malaga-Torremolinos, 1984; amended at Melbourne, 1988)

1 General

The 60-channel transcoder implements a conversion between two 30-channel 2048 kbit/s PCM streams and one 60-channel 2048 kbit/s ADPCM stream. In the 30-channel 2048 kbit/s streams, the telephone signals are coded using 64 kbit/s A-law PCM as specified in Recommendation G.711. In the 60-channel 2048 kbit/s stream, the telephone signals are coded using 32 kbit/s ADPCM as specified in Recommendation G.721. Figure 1/G.761 indicates the nomenclature used for the three different signal ports A, B and C.

Note 1 - Administrations should take into account the guidance given in Recommendation G.721 concerning the use and transmission performance of 32 kbit/s ADPCM .

Note 2 - It should be noted that the transcoder equipment described in this Recommendation has a limited capability of transparently transmitting 64 kbit/s data channels and this should be taken into account in the planning of networks which are likely to evolve into an ISDN (see § 3.8).

This Recommendation is divided into two parts:

- § 2 contains the interface requirements associated with the port C. These requirements are not only applicable to the 60-channel transcoder equipment, but could be applied, in the future, to other equipment such as a 60-channel multiplex terminal, a 60-channel terminating unit at a TDM switch, or a TDMA terminal. In these latter cases, the A and B interfaces would be virtual. As well as point-to-point operation, account has been taken of multi-destination operation in TDMA applications.
- § 3 contains the requirements which are specific to a 60-channel transcoder equipment realization.

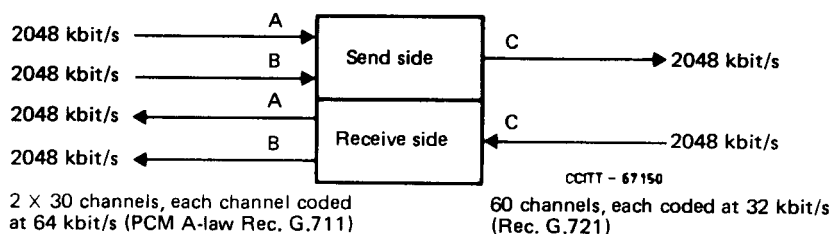


FIGURE 1/G.761

60-channel transcoder ports

2 Characteristics of a 2048 kbit/s signal organized in 64 kbit/s and/or 32 kbit/s time slots (port C)

2.1 Interface C

The electrical characteristics of the 2048 kbit/s interface are in accordance with Recommendation G.703, § 6.

2.2 Frame structure

The frame structure is in accordance with Recommendation G.704, § 2.3, with bit 1 of time slot 0 used for the cyclic

redundancy check (CRC) procedure.

Time slots 1 to 15 and 17 to 31 each corresponds to:

- either two 4-bit samples of telephone signals coded using 32 kbit/s ADPCM originating from the same incoming PCM stream (A or B); the bit ordering of the 32 kbit/s signals is such that the 4-bit words are transmitted in bit order starting with bit 1 (see §§ 4.2.2 and 4.2.3 of Recommendation G.721). Bits 1 to 4 correspond to the first 32 kbit/s signal and bits 5 to 8 correspond to the second 32 kbit/s signal;
- or a digital signal at 64 kbit/s.

Where stream C is transmitting 60 telephone signals, the numbering of the channels and the correspondence between the 64 kbit/s PCM channels in streams A and B and the 32 kbit/s ADPCM channels in stream C are given in Table 1/G.761.

TABLE 1/G.761

Organization of 2048 kbit/s frame for 60-channels at 32 kbit/s (stream C)

8-bit time slot number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Bits 1-4 of channel	-	1A	1B	3A	3B	5A	5B	7A	7B	9A	9B	11A	11B	13A	13B	15A
Bits 5-8 of channel	-	2A	2B	4A	4B	6A	6B	8A	8B	10A	10B	12A	12B	14A	14B	16A

8-bits time slot number	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Bits 1-4 of channel	Note 2	15B	17A	17B	19A	19B	21A	21B	23A	23B	25A	25B	27A	27B	29A	29B
Bits 5-8 of channel	Note 2	16B	18A	18B	20A	20B	22A	22B	24A	24B	26A	26B	28A	28B	30A	30B

Note 1 - The organization of the frame has been chosen to facilitate the direct time slot transfer described in § 3.8.

Note 2 - TS16 is foreseen for signalling but speech channels can be transmitted when necessary. These are numbered 31A and 31B respectively for Bits 1-4 and Bits 5-8 (see § 2.5).

Note 3 - The numbering of the channels from 1 to 30 and the correspondence with the time slots in PCM stream A (respectively B) are given in Recommendation G.735, § 2.

2.3 Allocation of bits in time slot 0

The allocation of the bits in time slot 0 is given in Recommendation G.704, § 2.3, with bit 1 of time slot 0 used for the cyclic redundancy check procedure.

Bits 3 to 8 in TS0 of those frames not containing the frame alignment signal are used to transmit:

- alarm indications associated with PCM streams A or B (see §§ 2.6.2 and 2.6.3 dealing with alarm indications);
- spare bits associated with PCM streams A or B (see § 3.3).

2.4 Frame alignment and CRC procedures

The strategy for loss and recovery of frame alignment and CRC multiframe alignment is given in Recommendation G.706, § 4.

2.5 Allocation of bits in TS16

TS16 can be used:

- either for signalling purposes; namely channel associated signalling (see § 2.5.1) and common channel signalling (see § 2.5.2);
- or, as envisaged in § 5.1 of Recommendation G.704, for the transmission of telephone signals; in this case two samples of telephone signals each coded with 4 bits. Used in this way, stream C can transmit up to 62 telephone signals. Bits 1 to 4 and 5 to 8 of stream C will correspond to 64 kbit/s PCM signals transmitted in TS16 of PCM streams A and B respectively.

2.5.1 Channel associated signalling

The allocation of bits in TS16 will depend on the number of signalling bits per channel.

2.5.1.1 Two or less signalling bits per channel

This applies to the digital version of Signalling System R2 (see Recommendation Q.421) specified for international applications. This also applies to a number of national signalling systems.

TS16 is organized in multiframes. Each multiframe contains 16 consecutive frames, numbered from 0 to 15. The multiframe repetition frequency is 500 Hz.

2.5.1.1.1 Allocation of bits in TS16 frame 0

Table 2/G.761 indicates the content of TS16 frame 0.

Bits 1 to 4 are fixed at 0 and constitute the multiframe alignment signal.

Bits 5 and 8 are used to indicate "AIS in TS16" of PCM streams A and B (see § 2.6.5).

Bits 6 and 7 are used to transmit the remote alarm indications associated with the multiframe of PCM streams A and B (see § 2.6.6).

TABLE 2/G.761
Content of TS16 frame 0

Bit number							
1	2	3	4	5	6	7	8
0	0	0	0	X ₅	X ₆	X ₇	X ₈

2.5.1.1.2 Allocation of bits in TS16 frames 1 to 15

Table 3/G.761 indicates the content of TS16 in frames 1 to 15.

This allocation of bits provides each 32 kbit/s channel with two signalling channels at 500 bit/s nominated "a" and "b" as defined in Recommendation G.704, § 5.1.3.2.2.

To minimize the risks of simulation of the multiframe alignment signal, special processing of certain signalling bits is carried out as described in § 2.5.1.1.3.

In the case of direct transfer of some 64 kbit/s time slots of PCM streams A or B, the four bits of TS16 associated with the transferred time slots will be transparently transmitted and allocated in accordance with Table 7/G.704. They will not be subject to the special processing described in § 2.5.1.1.3. The four bits of time slot 16 associated with each of the time slots not used in PCM streams A and B because of the direct transfer will be restituted by the transcoder with the following values:

a = 0; b = 1; and d = 1, in conformity with Table 9/G.704.

The signalling distortion of any signalling channel will not be greater than **Error! Bookmark not defined.** 2 ms.

TABLE 3/G.761
Content of TS16 frames 1 to 15

Time slot 16 bit number	1 2	3 4	5 6	7 8
Signalling	Channel a b	Channel a b	Channel a b	Channel a b
Frame 1	1A	2A	15B	16B
Frame 2	1B	2B	17A	18A
Frame 3	3A	4A	17B	18B
Frame 4	3B	4B	19A	20A
Frame 5	5A	6A	19B	20B
Frame 6	5B	6B	21A	22A
Frame 7	7A	8A	21B	22B
Frame 8	7B	8B	23A	24A
Frame 9	9A	10A	23B	24B
Frame 10	9B	10B	25A	26A
Frame 11	11A	12A	25B	26B
Frame 12	11B	12B	27A	28A
Frame 13	13A	14A	27B	28B
Frame 14	13B	14B	29A	30A
Frame 15	15A	16A	29B	30B

Note - The organization of the multiframe ensures consistency with the frame and multiframe organization of Recommendation G.704, § 5.1.3 and allows the possibility of the mixed use in stream C of 32 kbit/s and 64 kbit/s channels with their associated signalling.