INTERNATIONAL TELECOMMUNICATION UNION

ITU-T G.734

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

GENERAL ASPECTS OF DIGITAL TRANSMISSION SYSTEMS

TERMINAL EQUIPMENTS

CHARACTERISTICS OF SYNCHRONOUS DIGITAL MULTIPLEX EQUIPMENT OPERATING AT 1544 kbit/s

ITU-T Recommendation G.734

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation G.734 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.

Recommendation G.734

CHARACTERISTICS OF SYNCHRONOUS DIGITAL MULTIPLEX EQUIPMENT OPERATING AT 1544 kbit/s

(former Recommendation G.736 of Volume III of the Yellow Book)

1 General characteristics

This Recommendation defines the characteristics of a synchronous multiplex equipment currently used for applications in dedicated data networks, to combine up to 23 tributary channels at 64 kbit/s in a 1544 kbit/s digital stream.

Note - For applications within an ISDN, it is expected that a 24-channel multiplex will be used that has a frame structure conforming to Recommendation G.733.

1.1 *Bit rate*

The nominal bit rate is 1544 kbit/s.

Note - The tolerance on this rate should be studied and specified.

1.2 *Timing signals*

It should be possible to derive the multiplexer timing signals from the composite clock signal of a centralized clock source as specified in Recommendation G.703, and from the 1544 kbit/s incoming digital stream.

Note - The desirability of also providing a 1544 kHz transmitting timing signal from a centralized clock source should be further studied.

2 Frame structure

2.1 *Number of bits per channel time slot*

There are eight bits per channel time slot, numbered from one to eight.

2.2 *Number of channel time slots per frame*

There are 24 time slots per frame, numbered from 1 to 24. Successive bits for bytes 1 to 24 should be consecutively numbered from 2 to 193. The first bit should be reserved for optional use. The frame repetition rate is 8000 Hz.

2.3 *Channel time slot assignment*

2.3.1 Channel time slots 1 to 23 are assigned to tributaries.

2.3.2 Channel time slot 24 is assigned to frame alignment and service digits. Two alternative methods, as given in Tables 1/G.734 and 2/G.734 for allocation of these signals and associated frame alignment strategy are recommended.

TABLE 1/G.734

Allocation of time slot 24, Method 1

Bit number of time slot 24							
1	2	3	4	5	6	7	8
					Service digits		
Frame alignment signal							
1	0	1	1	1			0

Note - Loss of frame alignment should be assumed to have taken place when more than three of twelve successive frames have an error in the frame alignment signal and/or in bit 1 of the 193-bit frame. Frame alignment should be assumed to have been recovered when four consecutive correct frame alignment signals have been received.

TABLE 2/G.734

Allocation of time slot 24, Method 2

Frame Number	Bit number of time slot 24							
	1	2	3	4	5	6	7	8
1	Service digits			Frame alignment signal				
				0	0	1	0	1
2				1	1	0	1	0

Note - Loss of frame alignment should be assumed to have taken place when seven consecutive pairs of the frame alignment signal (00101, 11010) have been incorrectly received in their predicted positions. Frame alignment should be assumed to have been recovered when two consecutive correct pairs of frame alignment signals have been received.

2.4 *Service digits*

The use of service digits in channel time slot 24 is under study.

Note - The first bit could be considered for framing algorithms.

3 Fault conditions and consequent action

3.1 *Fault conditions*

The digital multiplex equipment should detect the following fault conditions:

- failure of power supply,
- loss of the incoming signal at 1544 kbit/s,
- loss of frame alignment,
- loss of timing signals supplied from the centralized clock,
- alarm indication received from the remote digital multiplex equipment.

Some of the above fault conditions may optionally be detected by auxiliary equipment normally used in association with the digital multiplex equipment.

3.2 *Consequent actions*

Further to the detection of a fault condition, appropriate actions should be taken as specified in Table 3/G.734.

TABLE 3/G.734

Fault conditions and consequent actions for the digital multiplex equipment

Equipment part	Fault conditions	Consequent action (see Notes 1 and 2)		
		Prompt maintenance alarm indication generated	Alarm indication to the remote end transmitted (see Note 3)	Multiplex out-of sync signal applied to 64 kbit/s output (see Note 4)
Multiplexer and demultiplexer	Failure of power supply	Yes	Yes (if practicable)	Yes (if practicable)
Demultiplexer only	Loss of incoming signal at 1544 kbit/s	Yes	Yes	Yes
	Loss of frame alignment	Yes	Yes	Yes
	Alarm indication receive from the remote end	Yes		

Note 1 - A *Yes* in the table signifies that an action should be taken as a consequence of the relevant fault condition. An *open space* in the table signifies that the relevant action should *not* be taken as a consequence of the relevant fault condition, if this condition is the only one present. If more than one fault condition is simultaneously present, the relevant action should be taken if, for at least one of the conditions, a *Yes* is defined in relation to this action.

Note 2 - These consequent actions may optionally be taken by auxiliary equipment normally used in conjunction with the digital multiplex equipment.

Note 3 - The alarm indication to the remote end may be generated by changing a service bit of time slot 24 from the state 1 to the state 0, if possible.

Note 4 - The binary content of the multiplex out-of-sync signal is under study. One Administration uses 00011010.

4 Multiplexing method

Cyclic byte interleaving in the tributary numbering order should be used. The digital multiplex equipment should translate any incoming byte that contains only 0s into the zero byte suppression code.

Note 1 - The content of the zero byte suppression code is under study.

Note 2 - Further study is needed for the case when the zero suppression code must be extracted.

5 Input jitter and wander

The amount of jitter and wander that should be tolerated at the input of the demultiplexer should be according to Recommendation G.824, § 3.1.1.

6 Digital interface

The digital interface at 64 kbit/s and 1544 kbit/s should be in accordance with Recommendation G.703.