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SPLITTING ARRANGEMENTS AND SIGNAL RECOGNITION TIMES IN "IN-BAND" SIGNALLING SYSTEMS

ITU-T Recommendation Q.25

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation Q.25 was published in Fascicle VI.1 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 Q.25

SPLITTING ARRANGEMENTS AND SIGNAL RECOGNITION TIMES IN "IN-BAND" SIGNALLING SYSTEMS

1 General

In each "in-band" signalling system precautions should be taken so that, when the signalling in that system is taking place:

1.1 no interference in the voice-frequency range from outside the system can pass into the system (i.e. into the transmission path between the sending end and the receiving end of the voice-frequency signals), and

1.2 as far as possible, no signalling current used in the system can pass into other systems, connected in tandem.

2 Sending-end splitting arrangements

2.1 In order to satisfy the condition in § 1.1 above, care should be taken that the correct operation of the signal receiver at the other end of the circuit is not disturbed by:

- surges (transient currents) caused by the opening or closing of direct current circuits connected to the speech wires of the switching equipment, whether these surges precede or follow the sending of a signal;
- noise, speech currents, etc., coming from tandem switched circuits, preceding or during the sending of a signal.

2.2 For this reason the following arrangements have been made in the Signalling Systems No. 4 and No. 5 for the transmission of voice-frequency signals on the international circuit:

i) The exchange side of the circuit shall be disconnected 30 to 50 ms before a voice-frequency signal is sent over the circuit.

ii) The exchange side of the circuit will not be reconnected for 30 to 50 ms following the end of the sending of a voice-frequency signal over the circuit.

2.3 Arrangements of the same type are required on System R1 and on national "in-band" systems [see § 3.4.1 b) below].

3 Receiving-end splitting arrangements

3.1 *General*

3.1.1 In order to satisfy the condition in § 1.2 above, the length of the part of a signal which passes into another system is limited by splitting the speech wires beyond the signal receiver when a signal is received and detected by this receiver.

The time during which the first part (sometimes called *spillover)* of a received signal passes into another system, until the splitting becomes effective, is called "splitting time".

Too long a splitting time may result in interference to signalling on a tandem system depending on the signal recognition time on the tandem system.

Too short a splitting time may result in an increase in the number of false operations of the splitting device by speech currents *(signal imitation)* and so impair speech transmission.

The splitting time must therefore be a compromise between the above two factors.

The splitting device also serves to limit the duration of signals on one path of the 4-wire circuit from returning over the other path by reflections at the termination; these reflections may give rise to faulty operation of signalling equipment on the other path.

3.1.2 The protection against mutual interference between in-band signalling systems in international service involves limitations of the length of any part of:

3.1.2.1 the *international* signal that may be able to pass:

a) from the international signalling system into a national signalling system (protection of the national system);

b) from one international signalling system into another international signalling system, when they are switched in tandem (protection of the international systems);

c) from one international circuit into another international circuit of the same system when they are switched in tandem in the case of link-by-link signalling.

3.1.2.2 the *national* signal that may be able to pass:

a) from the national signalling system into an international signalling system (protection of the international system);

b) from one national signalling system into the national signalling system of another country via an international connection (protection of the national system).

3.2 *Protection of national and international systems against international systems*

Conditions in § 3.1.2.1 above are met because international signalling systems have a splitting device on each circuit. The splitting times of such systems are:

55 milliseconds for the compound signal element in System No. 4;

35 milliseconds for a signal in System No. 5;

20 milliseconds for a signal in System R1.

3.3 *Protection of the international system against national systems*

The condition in § 3.1.2.2 a) above is generally covered because:

- the values given in the specifications of the CCITT standard systems as the minimum recognition time of a line signal are in general greater than the splitting times of national systems (see the tables giving the basic characteristics of national signalling systems in Supplement No. 3 at the end of this fascicle);
- the signalling frequencies used in the international systems are, in the majority of countries, different from those used in national systems.

It may be necessary, if the splitting time of a national signalling system is greater than the minimum signal recognition time of an international system and the signalling frequencies used in the national system and international system are the same or nearly the same, to insert a device at the international exchange which will prevent a part of the national signal from passing into the international circuit for longer than this recognition time.

3.4 *Interference between national signalling systems when they are interconnected via an international circuit*

3.4.1 To ensure protection of national signalling systems one against the other [protection defined under § 3.1.2.2 b) above], it has been recommended by the CCITT since 1954 that new national "in-band" signalling systems should comply with the following two clauses:

a) not more than 35 milliseconds of a national signal should be able to pass into another country;

b) the connection between an international circuit and a national circuit should be split on the national circuit at the international exchange 30 to 50 milliseconds before that exchange sends any signal over the national signalling system.

Note - The object of these two clauses is to avoid interference, especially in conditions that may exist on international automatic connections.

3.4.2 The requirement of § 3.4.1 a) permits the signalling system used in country A to have a minimum signal recognition time based on this value of 35 milliseconds. It will then be possible to ensure, without taking any other precautions at the incoming end of an international circuit, that no fraction of a signal coming from country B, and being of the same, or nearly the same, frequency as that used in country A, will be wrongly recognized as a signal in country A.

One method of meeting the requirement of § 3.4.1 a) is to adopt a splitting time of less than 35 milliseconds for the national systems.

Another method exists which does not involve such a limitation in the splitting times of national systems, and which might be preferred when the design of the national signalling system is such that a short splitting time is not normally justified for that system alone. This second method involves the introduction, in the international exchange, of an arrangement for limiting the length of national signals which are liable to pass into the international circuit. Such an arrangement would be used only on circuits to those countries where there is a danger that interference might arise.

3.4.3 The requirement of § 3.4.1 b) avoids the false operation of the guard circuit of a signal receiver situated at the distant end of a national circuit.