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**LINE SIGNALLING (ANALOGUE VERSION)
WITH METERING**

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NOTES

- 1 CCITT Recommendation Q.400 Supplement No. 5 was published in Fascicle VI.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 Q.400 Supplement No. 5

LINE SIGNALLING (ANALOGUE VERSION) WITH METERING

1 General

Signalling System R2 may be used as an integrated signalling system for national and international traffic in a national network. Under certain conditions it is desirable to have additional line signals available, and in particular a metering signal in order to permit the charging of national calls and international calls generated in the national network concerned.

This supplement to the specifications of Signalling System R2 deals only with the clauses for exchange line signalling equipment which has been changed in order to take care of the addition of new operating conditions created by the additional metering signals and related only to the requirements of a national network. The conditions of the interruption control have been adapted accordingly.

The transmission of the metering signal can be extended over a maximum of three links between the subscriber exchange and the exchange where the charging equipment has been installed.

2 Line conditions

Taking into account the time sequence, the circuit will have the seven characteristic operating conditions shown in Table 1.

TABLE 1

State of the circuit	Line signalling conditions	
	Forward	Backward
1. Idle	Tone-off	Tone-on
2. Seized	Tone-off	Tone-on
3. Answered	Tone-off	Tone-off
4. Metering	Tone-off	Pulses tone-on
5. Forced release	Tone-off	Tone-on
6. Release	Tone-on	Tone-on or off
7. Blocked	Tone-on	Tone-off

3 Clauses for exchange line signalling equipment

3.1 *Recognition time for transition of signalling condition*

The recognition time for a changed condition (transition from tone-on to tone-off or vice versa) is 40 ± 10 ms according to the decisions taken by Study Group XI of the CCITT. The definition of the recognition time is indicated in Recommendation Q.412, § 2.2.1.

3.2 *Normal operating conditions*

3.2.1 *General*

Except for the states, metering and forced release, the other states (seizure, answered, release, blocking and release-guard) follow the same states as those indicated in Recommendation Q.412, § 2.2.2. Instead of the situation "release in clear-back state" a situation "release in forced release state" is possible.

3.2.2 *Metering*

The metering signals are pulse-type signals transmitted backwards during the conversation on a link-by-link basis. They are the only signals for which a repetition of the actual signal in a link-by-link basis is necessary in order to avoid an unacceptable distortion of the metering signals.

For the meter pulses the following limits have to be respected:

- sending: 120-180 ms;
- recognition time between the recognized transitions at the receiving side: 60-90 ms.

For the interval between metering signals, the following sending limit has to be observed: minimum 300 ms.

The time at the sending end between the answer signal and the start of the first metering signal and between the end of the last metering signal and the start of the forced release signal shall be more than 300 ms.

3.2.3 Forced release (see Figures 1 and 2)

When the called subscriber clears at the end of a call, the exchange which controls the connection will receive the clear-back signal from the called subscriber's end. If the calling subscriber does not clear within a period defined by the Administration concerned for national traffic, and according to Recommendation Q.118 for international traffic, the controlling exchange stops metering, transmits forced release to the preceding exchange and clears forward the succeeding part of the connection. In the preceding exchange, the forced released signal will only be recognized after 300 ms or more in order to avoid confusion with a metering signal.

After recognition of the forced release signal in the originating exchange, the tone-on condition will be transmitted forwards and the part of the connection to the controlling exchange will be released.

The release procedure is identical to the one specified for the analogue version of the line signalling.

There is no forced release in case of no reception of the answer signal in the controlling exchange following an address-complete signal. After a period defined by the Administration concerned for national traffic, and according to Recommendation Q.118 for international traffic the controlling exchange sends busy tone to the calling subscriber and sends clear-forward to release the succeeding part of the connection.

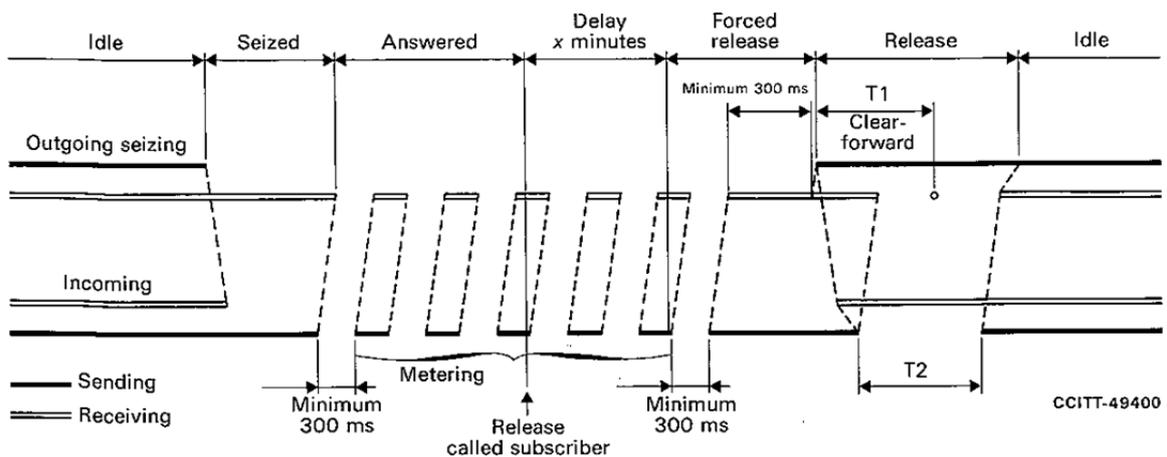


FIGURE 1

Forced release in answered state

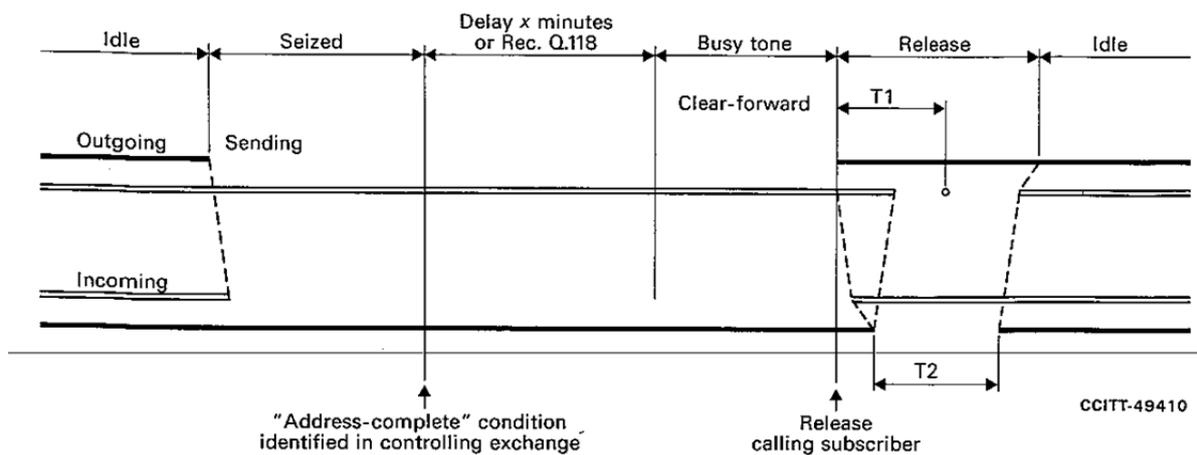


FIGURE 2
Release prior to answer state

4 Mode of operation of interruption control

4.1 General

Generally speaking, it can be said that the mode of operation of the interruption control complies with the specifications of Signalling System R2, and in particular with Recommendation Q.416. However, it is necessary to define the work of operation of the interruption control for the following conditions:

- a) circuit in answered state (metering in the backward direction);
- b) circuit in forced release state.

4.2 Mode of operation of interruption control at the incoming end (transmission interrupted in the forward direction)

a) Circuit in answered state

Transition of interruption control to alarm brings about:

- i) locking of the sending unit in its position, i.e. in the tone-off condition; if, at the moment of operation of interruption control the tone-on condition existed on the backward direction (metering signal), it will be locked in the tone-off condition;
- ii) locking of the receiving unit in its position, i.e. in the tone-off condition.

The other conditions are also in agreement with the specifications described in Recommendation Q.416, § 2.4.2.1 c).

b) Circuit in forced release state (transmission of forced release signal in backward direction)

Transition of interruption control to alarm brings about:

- i) locking of the sending unit in its position, i.e. in the tone-on condition;
- ii) locking of the receiving unit in its position, i.e. in the tone-off condition;
- iii) immediate release of the part of the connection beyond faulty circuit (including the called subscriber's line).

The conditions are similar to the specifications described in Recommendation Q.416, § 2.4.2.1 d), "clear-back state".

4.3 Mode of operation of the interruption control at the outgoing end (transmission in the backward direction interrupted)

a) Circuit in answered state

In this case, transition of the interruption control to alarm does not cause immediate action. A clear-forward signal sent on the part of the connection preceding the faulty circuit must be repeated forward to ensure that, if the forward signalling channel is left intact, the part beyond the faulty circuit is cleared.

Once the interruption control reverts to normal, the connection is maintained provided the caller and the called subscriber are still holding. On the other hand, by the time the interruption control reverts to normal, the clear-forward signal may already have been sent and the situation will be the one described under circuit seized but not in answered state.

b) *Circuit in forced release state (transmission forced release signal in backward direction)*

Transition of interruption control to alarm causes locking of the receiving unit in its position, i.e. the tone-on condition. The procedures are similar to those in the position “clear-back state” in the specifications of the analogue version of the line signalling, Recommendation Q.416, § 2.4.2.2 b).

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