



INTERNATIONAL TELECOMMUNICATION UNION

**ITU-T**

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

**Q.458**

**SPECIFICATIONS OF SIGNALLING SYSTEM R2**

**INTERREGISTER SIGNALLING**

**RANGE, SPEED AND RELIABILITY OF  
INTERREGISTER SIGNALLING**

---

**RELIABILITY OF INTERREGISTER  
SIGNALLING**

**ITU-T Recommendation Q.458**

(Extract from the *Blue Book*)

---

## NOTES

1 ITU-T Recommendation Q.458 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.458

### 4.5.3 RELIABILITY OF INTERREGISTER SIGNALLING

#### 4.5.3.1 *General*

In signal transmission, reliability and speed are to some extent conflict requirements: the slower the signalling, the more reliable it is likely to be. System R2 combines the two essential requirements of speed and reliability, since it is a compelled system, adapting its signalling speed to the working conditions with minimum loss of reliability.

System R2 is protected against the acceptance of faulty information (multifrequency combinations consisting either of one frequency only or of more than two frequencies) by means of the *2-out-of-n* method of checking the number of frequencies received.

This protection is inoperative in the case of disturbances (noise, clicks, etc.) activating two, and only two, of the single frequency receivers; nor does it prevent the release of all the receivers (thus wrongly indicating the end of a multifrequency combination) in the event of an interruption caused by disturbances during transmission of a multifrequency combination.

Disturbances causing the operation of two single frequency receivers or the release of all the receivers are due mainly to short-lived, transient conditions. The recognition of faulty information due to such conditions can therefore largely be avoided by so designing the receiving part of the multifrequency signalling equipment that a multifrequency combination will be recognized only after a specified minimum time. During this time two, and only two, of the individual receivers are active and the absence of multifrequency combinations will be recognized only after a specified minimum time, during which all individual receivers are at rest. The degree of protection against faults due to the above-mentioned conditions is dependent on these times, which are included in the operating and release times defined for the receiving part of the multifrequency signalling equipment in Recommendation Q.451.

#### 4.5.3.2 *Error rate for compelled working*

The test of the multifrequency signalling equipment as a whole consists in continuous, compelled transmission of multifrequency combinations.

It must be ensured that all possible combinations of the forward and backward multifrequency combinations have equal probability of occurrence during the test period.

The error rate is observed at the receiving part at both ends of the link and is defined, for each end, as the number of errors divided by the number of combinations sent by the corresponding sending parts at each end of the link.

It is for each Administration to define the sources of permanent and impulsive noise to be applied to the interface between the sending and receiving parts in the light of its experience and local conditions.

The compelled working may be tested, on the one hand, by using test combinations of Type A (see Recommendation Q.455) in the presence of noise at a power level of -40 dBm and a uniform power distribution in the 300-3400 Hz band (filtered white noise) and, on the other hand, by using Type B test combinations in the presence of noise at a power level of -45 dBm and a uniform power distribution in the 300-3400 Hz band.

The error rates in these conditions will be:

- for Type A test combinations and noise at -40 dBm:  $\leq 10^{-5}$ ;
- for Type B test combinations and noise at -45 dBm:  $\leq 10^{-4}$ .