

RECOMMENDATION ITU-R F.380-4^{*,**}**Interconnection at baseband frequencies of radio-relay systems
for telephony using frequency-division multiplex**

(1956-1963-1966-1970-1974-1986)

The ITU Radiocommunication Assembly,

considering

- a) that frequency-division multiplex radio-relay systems may form part of an international circuit;
- b) that international connections between such systems, among themselves and with other radio-relay or line systems, may at times have to be made at baseband frequencies;
- c) that definitions for the points R and R' of interconnection at baseband frequencies are given in Annex 1 to this Recommendation and Fig. 1;
- d) that the levels of the points T and T' , which are the responsibility of the ITU-T (see ITU-T Recommendation G.213, Vol. III, Fascicle III.2), should be known to system designers,

recommends

- 1 that the important baseband characteristics for a frequency-division multiplex radio-relay system forming part of an international circuit are:
 - 1.1 maximum number of telephone channels;
 - 1.2 limits of band occupied by telephone channels;
 - 1.3 frequency limits of the baseband, including pilots or frequencies which might be transmitted to line;
 - 1.4 relative input and output power levels, at the points of interconnection R and R' ;
 - 1.5 nominal impedance of the baseband circuits at the point of interconnection;
- 2 that, as far as practicable, these characteristics should conform to the preferred values given in Table 1 (it is recognized that in certain cases and regions it may be desirable to use baseband characteristics other than those given, by agreement between the administrations concerned);
- 3 the return loss at the points of interconnection should be ≥ 24 dB.

* This Recommendation applies to line-of-sight and near line-of-sight radio-relay systems, and also to trans-horizon radio-relay systems of the capacities concerned.

** Radiocommunication Study Group 9 made editorial amendments to this Recommendation in 2001 in accordance with Resolution ITU-R 44.

TABLE 1

1	2	3	4	5	6	7	8
Maximum number of telephone traffic channels (Note 5)	Limits of band occupied by telephone channel (kHz)	Frequency limits of baseband (kHz) (Note 4)	Nominal impedance at baseband (Ω)	Relative power level per channel (dBr) (Notes 1, 2)			
				Radio-relay system output R (Note 7)	Main repeater station		Radio-relay system input R' (Note 7)
					T	T'	
24	12-108 (Notes 3, 6)	12-108 (Notes 3, 6)	150 bal.	-15	-23	-36	-45
60	12-252 60-300	12-252 60-300	150 bal. 75 unbal.	-15	-23	-36	-45
120	12-552 60-552	12-552 60-552	150 bal. 75 unbal.	-15	-23	-36	-45
300	60-1300 64-1296	60-1364	75 unbal.	-18	-23	-36	-42
600	60-2540 64-2660	60-2792	75 unbal.	-20 -23 ⁽¹⁾	-23 -33	-36 -33	-45 -42 ⁽¹⁾
960	60-4028 316-4188	60-4287	75 unbal.	-20 -23 ⁽¹⁾	-23 -33	-36 -33	-45 -42 ⁽¹⁾
1260 ⁽²⁾	60-5636 60-5564 316-5564	60-5680	75 unbal.	-28	-33	-33	-37
1800	312-8204 316-8204 312-8120	300-8248	75 unbal.	-28	-33	-33	-37
2700	312-12 388 316-12 388 312-12 336	300-12 435	75 unbal.	-28	-33	-33	-37

⁽¹⁾ For 600 and 960 channel systems, administrations have a choice between the alternative pairs of levels shown for points R and R' which apply in the following circumstances:

- 23 dBr at point R , -42 dBr at point R' ; used when the baseband interconnection level at points T and T' is -33 dBr;
- 20 dBr at point R , -45 dBr at point R' ; used when the baseband interconnection level at point T is -23 dBr and at point T' is -36 dBr.

⁽²⁾ Other limits of band occupied by telephone channels may be used by agreement between the administrations concerned.

Note 1 – The particular preferred values of the relative power level given in the Table are agreed with the ITU-T. These values apply to future systems.

Note 2 – The level shown is referred to a point of zero relative level in the system, in accordance with the practice of the ITU-T.

Note 3 – For 12-channel systems, either of the basic groups A (12 to 60 kHz) or B (60 to 108 kHz) recommended by the ITU-T may be accommodated in the band 12 to 108 kHz.

Note 4 – Including pilots or frequencies which might be transmitted to line.

Note 5 – Larger capacity systems are not excluded by the Table.

Note 6 – A permissible alternative arrangement uses the frequency range 6 to 108 kHz. With this first alternative, it is possible to use only the noise measuring channel, situated above the baseband according to Recommendation ITU-R F.398. A further permissible alternative arrangement uses the frequency range 12 to 120 kHz. With this second alternative, it is possible to use only a continuity pilot situated below the baseband, according to Recommendation ITU-R F.381.

Note 7 – The variation with frequency, over the range of baseband frequencies, of the equivalent loss of a homogeneous section of the hypothetical reference circuit from point R' to point R , should not exceed a limit of ± 2 dB relative to the nominal value except under abnormal propagation conditions. This tolerance is similar to that accepted by the ITU-T for line links by means of cable (see ITU-T Recommendation M.450).

It is desirable to study the variation of loss as a function of time.

ANNEX 1

Definition of the points of international connection at baseband frequencies

The points of international interconnection at baseband frequencies, called R' and R , form the input and output of a radio-relay system, conforming to ITU-T Recommendation G.423 and the present Recommendation.

At the output of the radio-relay system (point R), the following conditions are found in the baseband:

1 All the telephony groups (groups, supergroups, mastergroups, etc.), and the pilots (line regulating, frequency comparison and monitoring pilots) included in the baseband are assembled in the position in which they are transmitted, as defined in the ITU-T and ITU-R Recommendations mentioned above.

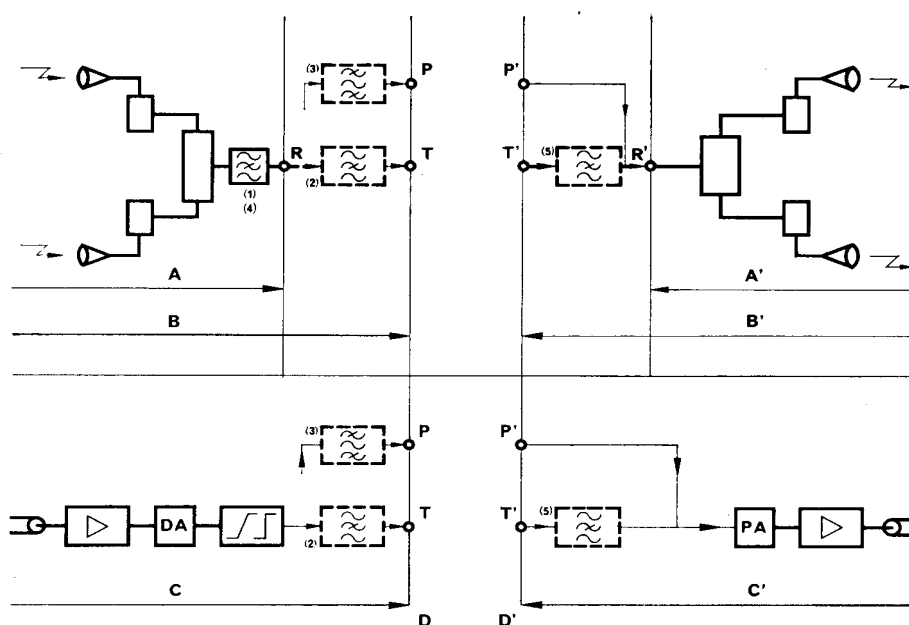


FIGURE 1

- A, A' :** Radio-relay system
 B, B' : Line link by means of radio-relay system
 C, C' : Line link by means of cable system
 D, D' : Boundary of the high-frequency line equipment
 R : Radio-relay system output
 R' : Radio-relay system input
Point P' : Provided for possible injection of regulating pilots
Between T and T' : Telephony translating equipment and/or direct through-connection equipment
 DA : De-emphasis network
 PA : Pre-emphasis network
(1): Blocking of continuity pilots, and if necessary, of regulating pilots
(2): Blocking, if necessary, of regulating pilots, and pilots that must not go beyond the line link
(3): Through-connection filter for regulating pilots, if necessary
 Through-connection filter for telephone groups can, if necessary, be inserted
(4): Blocking of unspecified pilots or supervisory signals
(5): Filter for blocking any unwanted frequency before injecting a pilot, ensuring with (2) the requisite protection against a pilot (or other) frequency coming from another regulated line section (B or C , as the case may be)

2 All the continuity and switching pilots and other signals transmitted in a radio-relay system outside the telephony band, inherent to the radio equipment, are suppressed in accordance with Recommendation ITU-R F.381.

3 Any radio-relay protection switching shall be performed as part of the radio-relay system. With diversity reception, the combined output of the receivers used corresponds to point R .

4 Any de-emphasis networks are part of the radio equipment, so that the relative levels of the telephone channels are independent of frequency, within the limits of the tolerances stated in Note 7 of this Recommendation.

A similar point R' is defined for the baseband input of a radio-relay system, where similar conditions are to be met.
