

RECOMMENDATION ITU-R F.1241*

**PERFORMANCE DEGRADATION DUE TO INTERFERENCE FROM OTHER SERVICES
SHARING THE SAME FREQUENCY BANDS ON A PRIMARY BASIS WITH DIGITAL
RADIO-RELAY SYSTEMS OPERATING AT OR ABOVE THE PRIMARY RATE
AND WHICH MAY FORM PART OF THE INTERNATIONAL PORTION OF
A 27 500 km HYPOTHETICAL REFERENCE PATH**

(Question ITU-R 127/9)

(1997)

The ITU Radiocommunication Assembly,

considering

- a) that systems in the fixed service share many frequency bands on a primary basis with other services;
- b) that many radio-relay systems employing digital modulation for telephony are operational or planned for operation in these shared frequency bands;
- c) that the ITU-T has specified the error performance parameters and objectives for international constant bit-rate digital paths at or above the primary rate (see ITU-T Recommendation G.826);
- d) that the error performance objectives based on ITU-T Recommendation G.826 for digital radio-relay systems are given in Recommendation ITU-R F.1092 and apply over the period of any month;
- e) that it is necessary to specify the maximum allowable degradation in performance of digital radio-relay systems (DRRSs) operating in compliance with Recommendation ITU-R F.1092 due to interference from other services;
- f) that the allowable degradation in performance of DRRSs due to interference from systems of other services should be expressed as a permissible fraction of the error performance objectives (see Recommendation ITU-R F.1094);
- g) that the allowable degradation in availability, based on Recommendation ITU-R F.557, due to interference represents a less stringent objective than allowable degradation in performance,

recommends

- 1** that new DRRSs sharing the same frequency bands on a primary basis with systems of other services should be designed in such a manner that, in each direction of a radio-relay path of length, L , in the international portion of a constant bit-rate path at or above the primary rate, the allowable degradation in performance resulting from the aggregate of the emissions from systems of other services should not exceed the provisional limits given in Table 1 in any month;
- 2** that in the case of frequency bands which are shared with space services on a primary basis, the limits on allowable degradation in performance given in § 1 are those resulting from the aggregate of the emissions of earth stations and space stations, including associated telemetering, telecommand and tracking transmitters of the space services.

* This Recommendation should be brought to the attention of Radiocommunication Study Groups 4, 7, 8, 10 and 11.

TABLE 1

Objectives for degradation of performance due to interference (fraction of any month)

Rate (Mbit/s)	1.5 to 5	>5 to 15	>15 to 55	>55 to 160	>160 to 3 500
Errored second ratio (ESR)	$0.004 \times (F_L + B_L)$	$0.005 \times (F_L + B_L)$	$0.0075 \times (F_L + B_L)$	$0.016 \times (F_L + B_L)$	Under study
Severely errored second ratio (SESER)	$2 \times 10^{-4} \times (F_L + B_L)$				
Background block error ratio (BBER)	$2 \times 10^{-5} \times (F_L + B_L)$ (Note 1)	$2 \times 10^{-5} \times (F_L + B_L)$			

Distance allocation factor:

$$F_L = 0.01 \times L/500 \quad \text{for} \quad L \text{ (km)}$$

Block allowance factor:

$$(B_L)$$

– for intermediate countries:

$$B_L = B_R \times 0.02 \times L/L_{ref} \quad \text{for} \quad L_{min} < L \leq L_{ref}$$

$$B_R \times 0.02 \quad \text{for} \quad L > L_{ref}$$

– for intermediate countries:

$$B_L = B_R \times 0.01 \times L/L_{ref}/2 \quad \text{for} \quad L_{min} < L \leq L_{ref}/2$$

$$B_R \times 0.01 \quad \text{for} \quad L > L_{ref}/2$$

Block allowance ratio:

$$B_R \text{ (} 0 < B_R \leq 1 \text{) (see Note 2)}$$

Reference length:

$$L_{ref} = 1\,000 \text{ km (provisionally)}$$

Minimum path length:

$$L_{min} \text{ (see Note 3)}$$

NOTE 1 – For systems installed based on designs prior to 1996, the BBER interference objective is $3 \times 10^{-5} \times (F_L + B_L)$.NOTE 2 – The maximum values for the block allowance B_L (for $B_R = 1$) are based on the apportionment principles given in ITU-T Recommendation G.826. Further studies are required to determine what portion of the total value of the block allowance given in ITU-T Recommendation G.826 can be used for transmission components. Administrations may tentatively decide to use the block allowance up to the total value ($B_R = 1$).NOTE 3 – The minimum applicable path length, L_{min} , is under study.

NOTE 4 – The limits on allowable interference from space services apply to the aggregate effect of emissions from space stations, direct long-term emissions from earth stations and interference due to the anomalous propagation of emissions from earth stations.