

RECOMMENDATION ITU-R F.1606

Interference criteria to protect fixed wireless systems from time varying aggregate interference produced by non-geostationary satellites operating in other services sharing the 37-40 GHz and 40.5-42.5 GHz bands on a co-primary basis

(Question ITU-R 127/9)

(2003)

The ITU Radiocommunication Assembly,

considering

- a) that it is desirable to determine the protection criteria of fixed wireless systems (FWS) operating in the 38 GHz (37-40 GHz) and 40 GHz (40.5-42.5 GHz) bands with respect to aggregate interference from systems of other services operating co-primary, especially short-term interference;
- b) that in interference situations involving non-geostationary (non-GSO) space stations, FWS are potentially exposed to high levels of interference for short periods of time which could affect the performance or availability of these systems;
- c) that the FS link design in the 38 and 40 GHz bands is controlled by rain attenuation, which can be modelled using Recommendation ITU-R P.530;
- d) that in the 38 and 40 GHz bands, some administrations employ automatic transmitter power control (ATPC) on some FS links and that such use will increase the susceptibility of these links especially with regard to short-term interference;
- e) that some FS links employing small net fade margins may not be fully protected from interference from non-GSO satellite systems without unduly constraining those services;
- f) that typical FS links using ATPC will require tighter protection criteria than those needed for FS links with large fade margin that do not use ATPC;
- g) that it is desirable to derive the aggregate FS protection criteria based on the calculation of the allowable degradation of error performance objective (EPO) due to interference, considering typical FS links using ATPC features;
- h) that the determination of the maximum degradation of EPO allowable to interference from other services sharing the same frequency band on a co-primary basis is given in Recommendation ITU-R F.1094;

j) that the allowable degradation in performance of FWS due to interference from other services sharing the same frequency bands on a primary basis, expressed as a permissible fraction of the total EPO is defined in Recommendation ITU-R F.1565,

recognizing

a) that the bands 37.5-40 GHz and 40.5-42.5 GHz are shared on a co-primary basis with the FSS, and that Recommendation ITU-R SF.1484 provides pfd levels that are required to protect the FS in these bands;

b) that the application of the criteria in this Recommendation is not intended to lead to a revisitation of the conclusions stated in the Recommendation referenced in *recognizing* a) above,

recommends

1 that the following interference criteria should be used to protect the FS systems from varying aggregate interference from systems of other services operating in the 37-40 GHz and the 40.5-42.5 GHz bands on a co-primary basis;

1.1 for the long term, the I/N at the input of the FS receiver should not exceed -10 dB for more than 20% of the time (see Note 1);

1.2 for the short term, the I/N at the input of the FS receiver should not exceed $+10$ dB for more than 0.013% of the time, for systems designed in compliance with ITU-T Recommendation G.828, and 0.05% of the time for other systems (see Note 1);

1.3 for the short term, for some links in certain broadband wireless access (BWA) applications, the I/N at the input of the FS receiver should not exceed $+5$ dB for more than 0.013% of the time, for systems designed in compliance with ITU-T Recommendation G.828 and 0.05% of the time for other systems (see Note 1);

2 that the information contained in Annex 1 should be used as guidance for the use of this Recommendation.

NOTE 1 – These I/N levels are referenced to the total noise at the receiver input including system noise level ($k T B F$) and 1 dB for intra-service interference (see § 5 in Annex 1).

Annex 1

Derivation of FS aggregate protection criteria in the 37-40 GHz and 40.5-42.5 GHz bands

1 Introduction

The methodology presented in this Annex is based on the assumption that fading in the 38 GHz and 40 GHz bands is dominated by rain and that, therefore, even if long-term interference has an effect on the performance of the link, the main way to have an outage of the FS link is to have an interference level higher than the fade margin of the link, whatever the propagation conditions may be.

On this basis, the following apportionment of the effect of interference on the degradation of the link (and on the EPOs) has been assumed:

- 20% of FS link degradation due to long-term interference;
- 80% of FS link degradation due to short-term interference.

2 EPOs

The allowable degradation in performance of real FWS due to interference from other services sharing the same frequency bands on a primary basis are expressed as a permissible fraction (10%) of the total EPOs and are defined in Recommendation ITU-R F.1565.

FS systems are currently used in the 38 GHz band for the access networks or mobile telephone infrastructure networks for both point-to-point (P-P) and point-to-multipoint (P-MP) applications. Since the same applications are already foreseen in the 40 GHz band the same reference EPOs have been used for the present studies in both bands based on either the access network section or short-haul inter-exchange network section, which are given as similar in Recommendation ITU-R F.1565.

The corresponding EPO values are given in Table 1, and correspond to the following assumptions:

- Short-haul inter-exchange or access network section (Tables 4a and 4b, or 5a and 5b of Recommendation ITU-R F.1565);
- Rate VC-3 in Tables 4a and 5a, and rate from 15 to 55 Mbit/s in Tables 4b and 5b;
- $B = C = 8\%$.

TABLE 1

	EPO (fraction of any month) based on the application of Recommendation ITU-R F.1565		
	Total allowable to interference	Long-term interference (20%)	Short-term interference (80%)
Errored second ratio (ITU-T Rec. G.826)	6×10^{-4}	1.2×10^{-4}	4.8×10^{-4}
Errored second ratio (ITU-T Rec. G.828)	1.6×10^{-4}	3.2×10^{-5}	1.3×10^{-4}
Severely errored second ratio	1.6×10^{-5}	3.2×10^{-6}	1.3×10^{-5}