



Report ITU-R M.2206
(11/2010)

**Sharing between the aeronautical mobile
service and the fixed service
in the band 37-38 GHz**

M Series
**Mobile, radiodetermination, amateur
and related satellite services**



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Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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***Note:** This ITU-R Report was approved in English by the Study Group under the procedure detailed in Resolution ITU-R 1.*

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Objective

This Report gives the results of sharing studies between the aeronautical mobile service and the fixed service in the band 37-38 GHz performed under the framework of WRC-12 Agenda item 1.12¹.

¹ This Report will be reviewed following WRC-12.

Abbreviations

AMS	Aeronautical mobile service
FDMA	Frequency-division multiple access
FDP	Fractional degradation in performance
FS	Fixed service
FSS	Fixed-satellite service
GSO	Geostationary satellite orbit
HDFS	High density applications in the fixed service
MSS	Mobile-satellite service
P-MP	Point-to-multipoint
P-P	Point-to-point
SRS	Space research service
WAIC	Wireless avionics intra-aircraft communications

References

- Recommendation ITU-R F.758 – Considerations in the development of criteria for sharing between the terrestrial fixed service and other services
- Recommendation ITU-R F.1245 – Mathematical model of average radiation patterns for line-of-sight point-to-point radio-relay system antennas for use in certain coordination studies and interference assessment in the frequency range from 1 GHz to about 70 GHz
- Recommendation ITU-R F.1094 – Maximum allowable error performance and availability degradations to digital fixed wireless systems arising from radio interference from emissions and radiations from other sources

1 Introduction

WRC-12 Agenda item 1.12 deals with the protection of primary services in the band 37-38 GHz from interference resulting from aeronautical mobile service operations, taking into account the results of ITU-R studies, in accordance with Resolution 754 (WRC-07).

This Resolution *resolves*

- 1** to invite ITU-R to conduct appropriate studies involving the aeronautical mobile service and the affected primary services in the band 37-38 GHz in order to determine the compatibility of the aeronautical mobile service with these other services;
- 2** to invite WRC-12 to review the results of the studies under *resolves* 1 and consider the inclusion of any appropriate compatibility criteria within the Radio Regulations (RR) or appropriate modifications to the Table of Frequency Allocations.

This Report analyses the protection of FS station receivers from interference that may occur from aircraft station transmitters operating under the mobile service primary allocation. The paper essentially addresses the case of point-to-point (P-P) FS stations. However, it is expected that the pfd mask derived for the protection of P-P systems will also cover the protection of point-to-multipoint (P-MP) system's central and customer stations.

The impact of a high density of FS stations on current AMS receivers is also analyzed.

2 P-P FS system characteristics

The characteristics of FS systems are provided in Recommendation ITU-R F.758-4 and reproduced in Table 1.

The pfd level corresponding to the FS nominal long-term interference spectral density given in the tables of Recommendation ITU-R F.758-4 may be expressed as follows:

$$pfd = I + L - G - 10 \log \left(\frac{\lambda^2}{4\pi} \right) \quad (1)$$

where:

I : protection criterion of the FS station (dBW/MHz)

L : feeder loss (dB)

G : antenna gain towards the AMS station (dBi)

λ : wavelength (m).

This equation may be directly used to determine the worst case in terms of susceptibility to interference between all P-P FS systems. Using Recommendation ITU-R F.1245 for the antenna pattern of the FS station, the worst cases may be determined using the long-term criterion at the horizon and at the zenith. In the first case, the antenna gain G is the maximum antenna gain of the FS station. In the second case the antenna gain G equals -13 dBi.

The worst case is taken into account in the following analyses and is reproduced in Table 1.

TABLE 1
Worst-case P-P FS characteristics

Channel spacing (MHz)	3.5	7	28
Antenna gain (maximum) (dBi)	47	47	47
Feeder/multiplexer loss (minimum) (dB)	0	0	0
Antenna type	Dish	Dish	Dish
Maximum Tx output power (dBW)	-15	-15	-15
e.i.r.p. (maximum) (dBW)	32	32	32
Receiver IF bandwidth (MHz)	3.5	7	28
Receiver noise figure (dB)	7.5	7.5	7.5
Receiver thermal noise (dBW)	-132.5	-129.5	-123.5
Nominal long-term interference (dBW)	-142.5	-139.5	-133.5
Spectral density (dB(W/MHz))	-147.9	-148.0	-148.0
Corresponding pfd at the horizon (dBW/m ² /MHz)	-142.0	-142.0	-142.0
Corresponding pfd at zenith (dBW/m ² /MHz)	-82.0	-82.0	-82.0