

Protection criteria of the fixed and mobile services in the band 470-806 MHz applicable for the coordination among Caribbean countries

1 Introduction

This document investigates the protection criteria of the fixed and mobile services in the band 470-806 MHz applicable for the coordination among countries in the Caribbean area. The protection criteria for the band 174-216 MHz is not provided in this document because no primary allocation is made to the fixed and mobile service in this frequency band.

Planning area	Parts of Region 2 area limited by longitude 50W – 122W and latitude 0N - 38N
Frequency bands	174 – 216 MHz and 470 – 806 MHz
Countries involved in the coordination meeting	Territories located within parallels 122-50W and Meridians: 0-38 N: ATG, B, BAH, BLZ, BRB, CLM, CTR, CUB, DMA, DOM,F (Geo areas BLM, GLP, GUF, MAF and MRT), G (Geo areas AIA, CYM, MSR, TCA and VRG), GRD, GTM, GUY, HND, HOL (Geo areas ABW, CUW and SXM), HTI, JMC, KNA, LCA, MEX, NCG, PNR, SLV, SUR, TRD, USA (Geo areas PTR and VIR), VCT and VEN.
Neighbouring countries	ARG, BOL, EQA, PRG, PRU, URG

2 Frequency allocations and identifications

2.1 Frequency allocations

The Table 1 shows the status of frequency allocations in the Article 5 of the Radio Regulations (RR).

TABLE 1
Frequency allocations
in the frequency band 174-216 MHz and 470-806 MHz in Region 2

Allocation in Table	Allocation by footnotes to FXM services			
	Region 2	Services	Area	Footnote
174-216 BROADCASTING Fixed Mobile			-	-
470-512 BROADCASTING	FIXED	CUB, EQA, GUY, JMC, PNR, USA, PTR (USA), VIR (USA)		5.293 (RR9.21)

Allocation in Table	Allocation by footnotes to FXM services		
Region 2	Services	Area	Footnote
Fixed Mobile 5.292 5.293 5.295	MOBILE	BAH, BRB, CUB, EQA, GUY, JMC, MEX, PNR, URG, USA, VEN, PTR (USA), VIR (USA)	5.292 5.293 (RR9.21)
512-608 BROADCASTING 5.295 5.297	FIXED	CTR, CUB, GTM, GUY, JMC, SLV, USA, PTR (USA), VIR (USA)	5.297 (RR9.21)
	MOBILE	BAH, BRB, CUB, CTR, GTM, GUY, MEX, JMC, SLV, USA, PTR (USA), VIR (USA)	5.297 (RR9.21)
608-614 RADIO ASTRONOMY Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)		-	-
614-698 BROADCASTING Fixed Mobile 5.293 5.308 5.308A 5.309 5.311A	FIXED	CUB, GUY, JMC, PNR, SLV, USA, PTR (USA), VIR (USA)	5.293 5.309 (RR9.21)
	MOBILE	BAH, BLZ, BRB, CLM, CUB, GUY, JMC, MEX, PNR, USA, PTR (USA), VIR (USA)	5.293 5.308 (RR9.21)
698-806 BROADCASTING MOBILE 5.317A Fixed 5.293 5.309 5.311A	FIXED	CUB, GUY, JMC, PNR, SLV, USA, PTR (USA), VIR (USA)	5.293 5.309 (RR9.21)

There is no primary allocation to the fixed and mobile services in the frequency band 174-216 MHz.

In the countries listed in Nos. **5.292**, **5.293**, **5.297**, **5.308** and **5.309** of the RR, portions of frequency band 470-806 MHz is allocated to the fixed and mobile services on a primary basis subject to obtain the agreement under No. **9.21** of the RR. The frequency band 698-806 MHz is allocated to the mobile, except aeronautical mobile, service on a primary basis.

2.2 Frequency identifications

In accordance with Nos. **5.295**, **5.308A** and **5.317A**, portions of frequency band 470-806 MHz are identified for International Mobile Telecommunication (IMT). (See Table 2 below.)

TABLE 2

Frequency bands identified for IMT
(in the frequency band 174-216 MHz and 470-806 MHz in certain countries)

Footnote	Frequency band (MHz)	Allocated service (application)	Area
5.295	470-608	LAND MOBILE (IMT)	BAH, BRB, MEX, USA, PTR (USA), VIR (USA)
5.308A	614-698	LAND MOBILE (IMT)	BAH, BRB, BLZ, CLM, MEX, USA, PTR (USA), VIR (USA)
5.317A	698-806	LAND MOBILE (IMT)	Region 2

These identifications in the bands allocated to the mobile service on a primary basis for use of International Mobile Telecommunications (IMT) does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. (WRC-15) Furthermore these identifications is subject to Resolution **224 (Rev. WRC-15)**.

3 System type analysis

3.1 Frequency assignments registered in the MIFR

Within the Region 2 area surrounded by longitude of 50W and 122W and latitude of 0N and 38N, total 1398¹ assignments have been registered in the MIFR for the fixed and mobile services in the frequency bands 174-216 MHz and 470-806 MHz. (85 in the band 174-212 MHz, 1307 in the band 470-698 MHz and 6 in the band 698-806 MHz) The bandwidth are between 16 kHz and 25 MHz and the most of them are using frequency modulation.

For those frequency assignments, the typical system characteristics can be found in Recommendations ITU-R [F.1670](#) and ITU-R [M.1767](#).

3.2 Advanced systems

Reports ITU-R [M.2039](#) and ITU-R [M.2292](#) introduce the characteristics of the IMT and IMT-Advanced systems which have possibility to be deployed in the frequency bands 470-806 MHz in some countries. Recommendation ITU-R M.1808 contains the characteristics of the trunked radio system (PPDR) which can be deployed in the frequency band 770-806 MHz and Recommendation ITU-R [F.1777](#) introduces a new fixed service system of broadcast auxiliary services (BAS).

3.3 System types

Table 3 shows the classification of the system type.

¹ From BR IFIC 2839 (21.02.2017).

TABLE 3
Classification of the fixed mobile service systems

Service	System type	References	Remark
Fixed	Generic	Rec. ITU-R F.1670	-
Mobile	Generic	Rec. ITU-R M.1767	-
	IMT and IMT-Advanced	Rep. ITU-R M.2039 and Rep. ITU-R M.2292	Nature of service 'IM'
	Trunked radio system	Rec. ITU-R M.1808	

4 Protection criteria for the fixed and mobile services interfered with by broadcasting service

Table 4 shows the field strength to be protected for the fixed and mobile services in the frequency band 470-806 MHz, which are calculated using the system characteristics given in the relevant ITU-R Recommendations and Reports listed above.

TABLE 4
Protection criteria for the fixed and mobile services
interfered with by broadcasting service ^{Note 1, 2}

System to be protected	Protected station	Freq. (MHz)	Noise Figure (dB)	Feeder Loss (dB)	Receiving antenna gain (dBi)	Field strength to be protected (dB μ V/m)		Receiving antenna height (m)
						6 MHz*	8 MHz*	
Generic fixed service system	Receiving fixed station	470-698	5	5	14	14.2	15.5	30
		698-806	4	1	15	11.7	12.9	
Generic mobile service system	Receiving base station	470-698	4	2	12	12.2	13.5	30
		698-806	3	4	17	11.7	12.9	
	Receiving land mobile station	470-698	7	0	0	25.2	26.5	1.5
		698-806	7	0	0	28.7	29.9	
	Receiving aeronautical station	470-698	4	2	12	12.2	13.5	30
		698-806	3	4	17	11.7	12.9	
	Receiving aircraft station	470-698	7	0	0	25.2	26.5	10000 ^{Note 3}
		698-806	7	0	0	28.7	29.9	
	Receiving coast station	470-698	4	2	12	12.2	13.5	30
		698-806	3	4	17	11.7	12.9	
	Receiving ship station	470-698	7	0	0	25.2	26.5	20
		698-806	7	0	0	28.7	29.9	
IMT system	Receiving base station	470-698	5	3	15	11.2	12.5	30
		698-806	5	3	15	14.7	15.9	
	Receiving land mobile station	470-698	9	0	-3	30.2	31.5	1.5
		698-806	9	0	-3	33.7	34.9	
Trunked radio	Receiving Base station	746-806	7	5	9	21.2	22.5	60

System (PPDR)	Receiving land mobile station	746-806	7	1	0	26.2	27.5	2
Trunked radio System (Other)	Receiving base station	746-806	7	5	9	25.2	26.5	60
	Receiving land mobile station	746-806	7	1	0	30.2	31.5	2

* TV channel bandwidth

Note 1: The field strengths ($E_{trigger}$) are calculated using the following equation.

$$E_{trigger} = -37 + N_F - G_r + L_F + 10 \log (B_i) + 20 \log (f) + I/N - K$$

where:

- N_F : receiving station noise figure (dB)
- G_r : receiving antenna gain (dBi)
- L_F : receiving antenna cable feeder loss (dB)
- f : center frequency of the interfering station (MHz)
- I/N : interference to noise ratio (dB)
- K : 0, if $B_i \geq B_r$; $10 \log_{10} (B_i/B_r)$, if $B_i < B_r$
(For this table, only the case of $B_i \geq B_r$ is assumed.)
- B_i : bandwidth of interfering signal (MHz)
- B_r : bandwidth of receiver interfered (MHz)

The field strengths are calculated assuming the co-channel interference case that both fixed and mobile systems and broadcasting system are using the lowest frequency and the bandwidth of the fixed and mobile systems which is narrower than the TV channel bandwidth. The protection ratio $I/N = -10$ dB is used for PPDR and -6 dB for other cases.

Note 2: The coordination distances are calculated using propagation curves of Recommendation ITU-R [P.1546](#) for 10% of time and 50% of locations with the coordination trigger field strengths produced at the antenna height of the typical receiving station given in the table above.

Note 3: For the calculation of distance for the protection of receiving aircraft station with the height of 10000 m, Recommendation ITU-R [P.528](#) is used.

Table 5 shows the field strength to be protected for IMT systems and fixed service systems which are using 10 MHz or 20 MHz bandwidth.

TABLE 5
Protection criteria for the IMT systems and fixed service systems
using 10 MHz or 20 MHz bandwidth

System to be protected	Protected station	Freq. (MHz)	Noise Figure (dB)	Feeder Loss (dB)	Receiving antenna gain (dBi)	Field strength to be protected (dB μ V/m)		Receiving antenna height (m)
						10 MHz	20 MHz	
Generic fixed service system	Receiving fixed station	470-698	5	5	14	16.4	19.5	30
		698-806	4	1	15	13.9	16.9	
IMT system	Receiving base station	470-698	5	3	15	13.4	16.5	30
		698-806	5	3	15	16.9	19.9	
	Receiving land mobile station	470-698	9	0	-3	32.4	35.5	1.5
		698-806	9	0	-3	35.9	38.9	