

Recommendation ITU-R M.2164-0

(11/2023)

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

Guidance on technical and operational measures for the use of the frequency band 1 240-1 300 MHz by the amateur and amateur-satellite service in order to protect the radionavigation-satellite service (space-to-Earth)

Foreword

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Series of ITU-R Recommendations

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Series	Title
BO	Satellite delivery
BR	Recording for production, archival and play-out; film for television
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BT	Broadcasting service (television)
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M	Mobile, radiodetermination, amateur and related satellite services
P	Radiowave propagation
RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R M.2164-0*

Guidance on technical and operational measures for the use of the frequency band 1 240-1 300 MHz by the amateur and amateur-satellite service in order to protect the radionavigation-satellite service (space-to-Earth)

(2023)

Scope

This Recommendation provides guidance on technical and operational measures for administrations authorizing stations operating in the amateur and amateur-satellite services to protect the radionavigation-satellite service (space-to-Earth) in the frequency band 1 240-1 300 MHz. The relevant measures are contained in the Annex to this Recommendation.

Keywords

Radionavigation-satellite service (RNSS), amateur service, amateur-satellite service

Related ITU Recommendations, Reports and Handbooks

Recommendation ITU-R M.1732 – Characteristics of systems operating in the amateur and amateur-satellite services for use in sharing studies

Recommendation ITU-R M.1787 – Description of systems and networks in the radionavigation-satellite service (space-to-Earth and space-to-space) and technical characteristics of transmitting space stations operating in the bands 1 164-1 215 MHz, 1 215-1 300 MHz and 1 559-1 610 MHz

Recommendation ITU-R M.1902 – Characteristics and protection criteria for receiving earth stations in the radionavigation-satellite service (space-to-Earth) operating in the band 1 215-1 300 MHz

Recommendation ITU-R M.2030 – Evaluation method for pulsed interference from relevant radio sources other than in the radionavigation-satellite service to the radionavigation-satellite service systems and networks operating in the 1 164-1 215 MHz, 1 215 1 300 MHz and 1 559-1 610 MHz frequency bands

Report ITU-R M.2458 – Radionavigation-satellite service applications in the 1 164-1 215 MHz, 1 215-1 300 MHz and 1 559-1 610 MHz frequency bands

Report ITU-R M.2513 – Studies regarding the protection of the primary radionavigation-satellite service (space-to-Earth) by the secondary amateur and amateur-satellite services in the frequency band 1 240-1 300 MHz

Report ITU-R M.2532 – Amateur and amateur-satellite services characteristics and usage in the 1 240-1 300 MHz frequency band

Handbook ITU-R 52 – Amateur and amateur-satellite services

The ITU Radiocommunication Assembly,

considering

a) that the International Amateur Radio Union (IARU) develops, maintains and publishes detailed band plans for the operation and development of the amateur and amateur-satellite services in all three Regions;

* This Recommendation should be brought to the attention of the International Amateur Radio Union (IARU).

- b) that Report ITU-R M.2532 provides information on the applications and operational characteristics of the use of the band 1 240-1 300 MHz by the amateur and amateur-satellite services;
- c) that Report ITU-R M.2513 provides studies and measurements regarding the amateur and amateur-satellite services transmissions and their potential to cause harmful interference to radionavigation-satellite service (RNSS) (space-to-Earth) that may, under certain conditions, exceed the protection criteria given in Recommendation ITU-R M.1902;
- d) that Recommendation ITU-R M.1902 provides the characteristics and protection criteria for RNSS (space-to-Earth) receivers operating in the band 1 215-1 300 MHz;
- e) that RNSS systems using the frequency band 1 240-1 300 MHz are operational, or becoming operational, worldwide, with the aim of supporting a wide range of new satellite positioning applications;
- f) that administrations wishing to implement this Recommendation may need a transition period to make the necessary changes to their national amateur and amateur-satellite services authorizations;
- g) that, taking into account *recognizing a), b), and c)* below, some administrations consider that existing spectrum management best practices and technical and operational measures may be sufficient to ensure protection of the RNSS,

recognizing

- a) that the frequency band 1 240-1 300 MHz is allocated to the RNSS (space-to-Earth) and (space-to-space) on a primary basis;
- b) that the frequency band 1 240-1 300 MHz is also allocated to the amateur service on a secondary basis;
- c) that the amateur-satellite service (Earth-to-space) may operate in the frequency band 1 260-1 270 MHz under the provisions of RR No. **5.282**;
- d) that the frequency band 1 240-1 300 MHz is also allocated worldwide to the Earth exploration-satellite service (active), radiolocation service (RR No. **5.329** applies) and the space research service (active) on a primary basis;
- e) that additional services are also allocated on a primary basis in some countries under RR Nos. **5.330** (fixed and mobile services) and **5.331** (radionavigation service) within the frequency band 1 215-1 300 MHz;
- f) that the amateur and amateur-satellite services continually develop their use of the frequency band 1 240-1 300 MHz in accordance with RR Nos. **1.56** and **1.57**;
- g) that the maximum power of amateur stations is fixed by the administrations concerned, as stipulated in RR No. **25.7**;
- h) that administrations licensing stations of the amateur and amateur-satellite services and assigning relevant frequencies, are responsible for the compliance of those stations with the relevant provisions of the RR, especially the protection of primary services in other administrations concerned;
- i) that in case of harmful interference to RNSS receivers from the amateur and amateur-satellite transmitters, the obligations and procedures of administrations to resolve such cases of harmful interference are stipulated in the provisions of RR Article **15**,

noting

that, taking into account *recognizing a), b), c), h)* and *i)* above, some administrations consider that additional measures beyond those in the Annex to this Recommendation may be needed to ensure protection of the RNSS,

recommends

that administrations wishing to allow operations or continue the operation of the amateur and amateur-satellite services across their territory in all or part of the frequency band 1 240-1 300 MHz, should use as guidance the technical and operational measures described in the Annex in order to protect RNSS (space-to-Earth).

Annex

Guidance on technical and operational measures for the use of the frequency band 1 240-1 300 MHz by the amateur and amateur-satellite service in order to protect the radionavigation-satellite service (space-to-Earth)

Taking into account *recognizing b) and c)*, this Annex provides technical and operational measures to be used as guidance by administrations wishing to allow or continue the operation of the amateur and amateur-satellite services across their territory in all or parts of the frequency band 1 240-1 300 MHz in order to protect RNSS; recognizing that other measures to protect RNSS may be implemented by administrations based on their national circumstances.

1) For narrowband (bandwidth ≤ 150 kHz) applications operating in the amateur service:

a) 1 240-1 255.76 MHz:

Maximum values of e.i.r.p.²:

-39.0 dBW in (150 kHz)	for	$-90^\circ \leq \theta < 0^\circ$
-39.0 dBW in (150 kHz)	for	$0^\circ \leq \theta < 5^\circ$
$-39.0 - 1.05(\theta - 5)$ dBW in (150 kHz)	for	$5^\circ \leq \theta < 25^\circ$
-60 dBW in (150 kHz)	for	$25^\circ \leq \theta < 90^\circ$,

where θ = elevation angle of amateur station antenna,

b) 1 255.76-1 256.52 MHz: Maximum value of e.i.r.p.² = 24 dBW,

- Out-of-band emissions below 1 255.76 MHz, should be as defined in point 1a) above.

c) 1 256.52-1 258 MHz: Maximum value of e.i.r.p.² = 21 dBW

d) 1 258-1 296 MHz: Maximum value of e.i.r.p.² = -17 dBW

e) 1 296-1 298 MHz: Maximum transmitter power³ = 17 dBW

f) 1 298-1 300 MHz: Maximum transmitter power³ = 22 dBW

- for narrowband Earth-Moon-Earth applications in the amateur service using a symmetric high-performance antenna (e.g. boresight gain at least 30 dBi) pointing at least 15 degrees above the horizontal:

a) 1 298-1 300 MHz: Maximum transmitter power³ = 27 dBW

² Where e.i.r.p. refers to the radiated power of the amateur station.

³ Where maximum power means either peak envelope power or carrier power (as appropriate) delivered by the transmitter to the amateur station antenna.

- 2) For narrowband applications operating in the amateur-satellite service (Earth-to-space) (bandwidth ≤ 150 kHz):
- a) 1 260-1 262 MHz:
 Maximum value of e.i.r.p.²:
- | | | |
|----------|-----|-----------------------------------|
| -3 dBW | for | $0^\circ \leq \theta < 15^\circ$ |
| 17 dBW | for | $15^\circ \leq \theta < 55^\circ$ |
| 26.8 dBW | for | $55^\circ \leq \theta < 90^\circ$ |
- where θ = elevation angle of amateur station antenna,
- b) 1 262-1 270 MHz: Maximum value of e.i.r.p.² = -17 dBW
- 3) For broadband (bandwidth > 150 kHz), including amateur television (ATV), applications operating in the amateur service:
- a) 1 240-1 255.76 MHz:
 Maximum values of e.i.r.p.²:
- | | | |
|---|-----|-------------------------------------|
| -39.0 dBW in (150 kHz) | for | $-90^\circ \leq \theta < 0^\circ$ |
| -39.0 dBW in (150 kHz) | for | $0^\circ \leq \theta < 5^\circ$ |
| $-39.0 - 1.05(\theta - 5)$ dBW in (150 kHz) | for | $5^\circ \leq \theta < 25^\circ$ |
| -60 dBW in (150 kHz) | for | $25^\circ \leq \theta < 90^\circ$, |
- where θ = elevation angle of amateur station antenna,
- b) 1 255.76-1 256.52 MHz: Maximum value of e.i.r.p.² = 24 dBW/150 kHz,
- Out-of-band emissions below 1 255.76 MHz, should be as defined in point 3a) above.
- c) 1 256.52-1 258 MHz: Maximum value of e.i.r.p.² = 21 dBW/150 kHz
- d) 1 258-1 300 MHz: Maximum value of e.i.r.p.² = -17 dBW/1 MHz
- 4) When amateur and amateur-satellite station antennas are installed at much higher antenna heights compared to the representative values contained in Report ITU-R M.2513-0 (representative antenna height above ground is 25 m), further constraints or limitations in addition to those listed in the above points 1) to 3) may need to be considered by administrations, in particular for cases of the amateur station category referred to as “permanent installations” such as repeaters and propagation beacons.
- 5) In addition to point 2) above, in case of an increase of the current use of the frequency band 1 260-1 270 MHz by amateur satellites, Administrations may consider applying a limitation to the duty cycle of relevant amateur satellite operations.
- 6) In the frequency range 1 240 to 1 256 MHz:
- Administrations should consider bilateral or multilateral agreements considering amateur transmissions near airports close to border areas in neighbouring countries which use aeronautical RNSS receivers in the frequency range above.
 - Administrations should be mindful about the location of amateur stations in order to avoid pointing the station antennamain lobe in the direction of airports and close to airports in countries which use aeronautical RNSS receiver in the frequency range above.
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