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Amateur and amateur-satellite services characteristics and usage in the 1 240-1 300 MHz frequency band

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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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REPORT ITU-R M.2532-0

Amateur and amateur-satellite services characteristics and usage in the 1 240-1 300 MHz frequency band

(2023)

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1 Introduction

The frequency band 1 240-1 300 MHz is allocated worldwide to the amateur service on a secondary basis and is used for a range of applications. The amateur-satellite service (Earth-to-space) may operate in the frequency band 1 260-1 270 MHz under No. **5.282** of the Radio Regulations (RR).

The frequency band 1 240-1 300 MHz is also allocated worldwide to the radionavigation-satellite service (RNSS) in the space-to-Earth and space-to-space direction on a primary basis. Many RNSS systems are operational, and various types of RNSS receivers are being used. Report ITU-R M.2458 summarizes the RNSS applications in this frequency band, and Recommendation ITU-R M.1902 gives the technical characteristics and protection criteria of the RNSS (space-to-Earth) receivers in the frequency band 1 240-1 300 MHz.

The number of RNSS receivers in the frequency band will increase significantly with the ubiquitous deployment of receivers used in many applications.

Resolution **774 (WRC-19)** invited ITU-R to study possible technical and operational measures to ensure the protection of RNSS (space-to-Earth) receivers from the amateur and amateur-satellite services in the frequency band 1 240-1 300 MHz, without considering the removal of these amateur and amateur-satellite service allocations.

This Report was developed in response to *resolves* 1 of Resolution **774 (WRC-19**) to perform a detailed review of the different systems and applications used in the amateur service and amateur-satellite service allocations in the frequency band 1 240-1 300 MHz.

2 Abbreviations and definitions

ATV	Amateur television, digital or analogue
AFSK	Audio frequency shift keying
D-STAR	Digital Smart Technology for Amateur Radio (Proprietary standard for digital voice and data communication
e.i.r.p.	Effective isotropic radiated power
FM-TV	Analogue (FM) Amateur TV
FSK	Frequency shift keying
IARU	International Amateur Radio Union
ITU-R	International Telecommunication Union, Radiocommunications Sector
MGM	Machine generated modes
PSK31	Phase Shift Keying Mode (31 Hz)
RNSS	Radionavigation-satellite service
RTTY	Radio teletype
SSTV	Slow scan TV
WSJT	Weak Signal Joe Taylor – Weak signal applications named after their inventor Dr Joe Taylor

3 ITU relevant publications

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.2034 – Telegraphic alphabet for data communication by phase shift keying at 31 baud in the amateur and amateur-satellite services

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

Question ITU-R 48-7/5 – Related results of ITU-R work on the Study Question on techniques and frequency usage in the amateur service and amateur-satellite service

Handbook– Amateur and amateur-satellite services

4 Amateur and amateur-satellite service band plans in the frequency band 1 240-1 300 MHz

Before going into the details of the individual amateur and amateur-satellite services applications in the frequency band 1 240-1 300 MHz, it is necessary to understand the general way in which amateur and amateur-satellite services activities are organised to maximise usage of the various frequency bands and minimise interference between incompatible amateur service applications. This is achieved through the use of band plans which recommend where particular applications are used within each amateur and amateur-satellite service allocations. The International Amateur Radio Union[1] (IARU) develops such band plans on behalf of all amateur services.

Amateur and amateur-satellite services band planning is achieved on a regional basis in order to take into account the regional differences with the frequency allocations. The current IARU recommended band plans for the frequency range 1 240-1 300 MHz across the three regions are summarized in Table 1.

The usage of the frequency range by the amateur and amateur-satellite services is driven by the varied operational and experimental interests of the users themselves. To support this, each regional band plan is developed to maintain order, avoid conflict and interference between amateur service applications, provide understanding of the most suitable frequencies for specific activities and form a basis for intra and inter-service coordination when required.

The band plans are not mandatory in regional regulations but are strongly recommended for adoption and in general are followed by the individual national societies. In some cases, the regional IARU band plan may be adopted to some extent in national regulations, and it may need to be adjusted on a national basis to facilitate national coordination and sharing with other services in the band.

Respecting the band plan is common practice in the amateur service and is necessary to facilitate successful radio contacts especially between countries and for inter-regional communications.

The band plan is reviewed periodically and may be adjusted to reflect new technologies and evolving applications in the amateur services. External influences driven by the requirements to share with other services can also be taken into account. The regional band plans are maintained, published and approved by the IARU regional bodies.

[1] The IARU coordinates and represents the interests of radio amateurs through its national member-associations. Three IARU regional organizations correspond to the ITU Radio Regions and are recognized as representing the amateur and amateur-satellite services by the regional telecommunications organizations.

The published band plans for each of the three regions may differ and may not be fully harmonised at the detailed level for every amateur service application. However, it is necessary to harmonise parts of the band for specific applications where these could involve inter-regional communications. This applies particularly to parts of the band recommended for narrowband weak signal applications.

Furthermore, the blocks identified for ATV use can accommodate a number of systems depending on the bandwidth occupied by the technology in use. The actual assignments are planned on a national basis.

TABLE 1

Global summary of amateur service and amateur-satellite-service IARU band plans

Frequency range (MHz)	Applications	Comments
1 240-1 260	Low bandwidth telegraphy, voice and data modes up to around 20 Hz. Amateur TV (ATV using analogue or digital technologies).	Organised into channelized groups for voice and data applications in some regions. One 16.75 MHz block is identified for ATV in this range in Region 1. Two 6 MHz blocks are identified for ATV in Region 2.
1 260-1 270	Satellite uplink band.	In Region 2 simplex ATV is also identified for experimental use in this range.
1 270-1 296	Low bandwidth telegraphy, voice and data modes up to around 20 kHz. Amateur TV (ATV using analogue or digital technologies).	Organised into channelized groups for voice and data applications in some regions. One 18.994 MHz block is identified for ATV in this range in Region 1. Two 6 MHz blocks are identified for ATV in Region 2.
1 296-1 297	Low bandwidth telegraphy, voice and data modes up to 3 kHz.	Focused on narrowband weak signal applications in all three regions including beacons. No channelization.
1 297-1 300	Low bandwidth voice and data modes up to around 20 kHz. Medium bandwidth data up to 150 kHz bandwidth.	Organized into channelized groups for voice and data applications in some regions.

5 Applications and typical operational characteristics of the amateur and amateur-satellite services operating in the frequency band 1 240-1 300 MHz

5.1 Amateur and amateur-satellite applications and station categories

The detailed list of amateur and the amateur-satellite services applications in the band 1 240-1 300 MHz can be divided into three categories:

Home station

This refers to equipment located at the station licence holder’s home address.

Temporary "portable" station

A temporarily sited station is usually located in an advantageous position (usually high ground) away from a home station location and operational for a short period radiosport contest, an experimental long-distance communication test or a time-limited special activity event.

Permanent installation (sometimes referred to as "automatic" or "unmanned" stations)

Permanent installations refer to stations installed away from a home station. They operate as propagation beacons, voice, amateur television (ATV) or data repeaters. As permanently installed stations, these are licensed by the national authority in their own right for their designated location, operating frequency and output power. The licence and responsibility of the station operation are usually associated with an already licensed radio amateur operator known as the "keeper" of the installation.

Propagation beacons are usually intended to operate continuously and are required to transmit a short repeating message using on/off keying or a narrow-band FSK signal with call sign ID and location information.

Voice repeaters usually re-transmit narrow-band analogue and digital voice traffic when activated with a signal on the input frequency and are mostly associated with extending geographic coverage area. Data and ATV repeater stations transmit wider bandwidth amateur signals and ATV repeater stations may transmit test signals when not being accessed by a user station on the input channel. All repeater stations are required by national regulations to transmit identification information.

Satellite communications (1 260-1 270 MHz, Earth-to-space only; see RR No. **5.282**) and mobile stations are possible, but these are rare in this frequency band. Tables 2 and 3 provide a matrix of the amateur and amateur-satellite applications versus station categories:

TABLE 2

Narrow-band amateur and amateur satellite applications against the station category

Application	Station type				Max. bandwidth	Comments
	Home	Temporary	Installation			
			Repeater	Beacon		
Voice (Analogue SSB)	Yes	Yes			2 700 Hz	Long distance tropospheric weak signal communications. Radiosport operation (incl.EME).
Voice (Analogue NBFM)	Yes	Yes	Yes		12 500 and 25 000 Hz (channel width dependent)	Local neighbourhood communications. Satellite communications.
Voice (Digital)	Yes		Yes		12 500 Hz	Local neighbourhood communications
Telegraphy (Morse code On/Off keying)	Yes	Yes		Yes	500 Hz	Long distance tropospheric weak signal communications. Radiosport[2] operation (incl. EME).

[2] See the Handbook Amateur and amateur-satellite services (https://www.itu.int/pub/R-HDB-52-2014) for further details of radiosport activities.

TABLE 2 (*end*)

Application	Station type				Max. bandwidth	Comments
	Home	Temporary	Installation			
			Repeater	Beacon		
Machine Generated Modes e.g. RTTY, SSTV[3], PSK31[4], WSJT[5]	Yes	Yes		Yes	6 to 2 700 Hz Mode dependent	Local and long distance tropospheric weak signal communications. (incl. EME). Imaging
Data e.g. AFSK 1k2, FSK 9k6, D-STAR[6], Digital Data 128 kbit/s	Yes	Yes (Mobile)	Yes		12.5 to 150 kHz Mode dependent	Local neighbourhood communication links.

TABLE 3

Wide band amateur applications against the station category

Application	Station type				Max. bandwidth	Comments
	Home	Temporary	Installation			
			Repeater	Beacon		
Analogue ATV (FM-TV)	Yes	Yes	Yes		20 MHz	Legacy technology, deployments decreasing.
Digital ATV (DVB Standards)	Yes	Yes	Yes		1-8 MHz Symbol rate dependent	State of the art technology, deployments increasing

Modern ATV installations employ spectrally efficient digital TV transmitters based on DVB-S/MPEG-2 signals. Symbol rates of 2 MBd or 4 MBd operate in lower bandwidth channels and further experimentation continues to increase the spectrum efficiency of amateur TV signals. It has been shown possible to transmit HD MPEG-4 signals with symbol rates less than 333 kBd in a bandwidth as little as 500 kHz.

[3] Slow Scan Television (SSTV) is an imaging protocol which is used to transmit images at a relatively low speed by using a frequency modulated subcarrier or digital encoding. Such transmissions are designed to fit within the bandwidth of a voice channel.

[4] See Recommendation ITU-R M.2034 which establishes a telegraphic alphabet and transmission protocols for phase shift keying at 31 baud (PSK31) in the amateur and amateur-satellite services.

[5] These WSJT applications consist of a number of highly structured data modes which send a limited amount of data with strong Forward Error Correction which allows the data to be recovered at very low signal-to-noise ratios. WSJT modes –Weak Signal Joe Taylor– are named after their inventor Dr Joe Taylor.

[6] D-STAR (Digital Smart Technologies for Amateur Radio) is a digital voice and data protocol specification for amateur radio. The system was developed in the late 1990s by the Japan Amateur Radio League and uses minimum-shift keying in its packet-based standard.

5.2 Typical amateur station antenna characteristics in the 1 240-1 300 MHz band

There is no standard amateur station and in most cases the antenna installation at any individual amateur station is constrained or influenced by the physical location and town planning restrictions. The following antenna types are typical and based on deployments detailed in published information relating to activity periods and reports from radiosport contests. In general home and temporary stations use highly directional, narrow beam width antennas in this frequency range.

Home station and temporary "portable" station antennas

Home stations generally use a single directional antenna; however, in a few cases multiple antennas are combined to increase the array gain. This is more usual for Earth-Moon-Earth (EME)[7] operators for whom high antenna gain is essential for overcoming the high path and reflection loss. A higher performance EME station might use instead a medium size dish antenna. Table 4 contains the antenna details:

TABLE 4

Typical home station and temporary "portable" station antennas

Antenna type	Gain (dBi)	3 dB beam width (degrees)
Single Yagi beam (23 to 55 element)	18 to 21	18 to 10
Multiple Yagi beams (for EME)	21	10
Dish antenna (for EME)	32 (4 m diameter)	4

Permanent installation antennas

Permanent installations operate for different applications using a variety of antenna types characterized by different gain and directivity figures. However, most permanent installations antennas are less directional and (in the case of repeaters) are generally intended to provide coverage over a local area. It should be noted that the antenna type used depends not only on the application but also on the local topography[8]. Table 5 summarizes antenna characteristics with indications of minimum, median and maximum parameter values of a typical installation.

[7] Earth-Moon-Earth (EME) communications use the Moon as a passive reflector which allows long distance communications between stations that have a simultaneous view of the moon. The reflected signals are very weak, though modern digital signal processing techniques and structured data modes reduce the need for high power transmitters.

[8] According to the extract from the database of one administration on unmanned amateur radio stations parameters, the antenna gain for 25th percentile, median and 75th percentile are 8.1 dBi, 11.2 dBi and 12.7 dBi. Minimum and maximum gain are found to be 2.15 dBi and 21.5 dBi. However, a gain of 21.5 dBi is exceptionally high in this application. It should be noted that those installations mostly operate in hilly and mountainous areas.

TABLE 5

Antenna characteristic of a typical permanent installation

Antenna types	Gain[9]	Beamwidth in the azimuth plane
Various (e.g. linear slot, co-linear array, horn, flat panel etc.)	Minimum = 2.15 dBi Median = 13 dBi Maximum: refer to footnote 7 for information	Median = 60° (−3 dB) Maximum = Omnidirectional

Antennas with linear polarization are mainly used, but occasionally circular polarization can also be found.

5.3 Typical amateur station power level distribution in the 1 240-1 300 MHz band

Typical power level distribution can be derived from published information about the stations that submit information resulting from national activity periods and reports from radiosport contests.

NOTE – In the following Tables, the power is specified differently because of the different sources of information.

Home station and temporary "portable" station

TABLE 6

Transmitter power ranges in use

Transmitter power (W)	Percentage home stations (%)	Percentage temporary stations (%)
Up to 10	47	61.5
11 – 25	9	7.5
26 – 100	26	7.5
101 – 300	12	15
Over 300	6	7.5

Permanent installation

Propagation beacon and repeater station directories can be consulted to gather information on the permanent stations deployed within a territory. They are usually licensed to operate at a specific ERP. Table 7 summarises information on stations in current use extracted from published information from a number of countries:

9 Feeder loss not included which may be up to 3 dB.

TABLE 7

Transmitter radiated power ranges in use

ERP (W)	Percentage propagation beacons (%)	Percentage repeaters (%)
Up to 10	69	16
11 – 25	8	76
26 – 100	20	8
101 – 300	1	0
Over 300	1	0

According to the information in Table 7, no repeater is currently in use with an ERP of more than 100 W. However, based on the extract from the license database of one administration on unmanned amateur radio stations parameters, it is indicated that some repeater / relay – stations are licensed to operate with a radiated power up to 380 W ERP[10], but the operational status of these stations is unknown. Note that there is a limit on the radiated power of unmanned stations given by national regulation and licensing conditions.

5.4 Representative antenna heights

The following antenna heights are representative of typical amateur station installations:

– Typical antenna height for a home station; 12 m above ground level.

– Typical antenna height for a temporary station; 3 m to 15 m above ground level.

– Typical height for a permanent installation station; 25 m above ground level.

Permanent installation stations are often installed at an advantageous location so as to take advantage of elevated local terrain or tall structures in order to increase the effective antenna height.

5.5 Amateur station 1 240-1 300 MHz band usage patterns

For all home and temporary “portable” station applications, narrow-band or wideband, the highest number of actively transmitting amateur stations can be found during the scheduled operating and radiosport contest periods. Table 8 summarises the total scheduled operating and contest periods scheduled in one region for a typical year. As these activities are usually formalised in the amateur operator calendars, the published national results[11] can be consulted to determine the number of transmitting stations that were active during any one activity or contest period.

[10] According to the extract from the license database of one administration on unmanned amateur radio stations parameters, 30% of repeaters are licensed to operate with an ERP of more than 100 W.

[11] The analysed results were published by the national radio amateur societies in several European countries.

TABLE 8

Scheduled operating periods and active operating station numbers

Usage type	Annual scheduled operating periods	Total active stations per scheduled operating period	Active temporary stations per scheduled operating period
Narrow-band activity period and radiosport (in the 1 296-1 297 MHz portion)	Total, on average 108 hours over a year	From 9 to 140 maximum depending on the country reviewed.	15 to 20 maximum depending on the country reviewed.
EME activity (in the 1 296-1 297 MHz portion)	5 × 24-hour contest periods	Up to 10 maximum depending on the country reviewed. (Maximum < 70 across the European area)	None
Wideband (typically ATV) activity period and radiosport (in any portion identified for ATV applications)	Total, on average 120 hours over a year	From 1 to 24 maximum depending on the country reviewed. (Maximum < 100 across the European area)	10 maximum depending on the country reviewed.

The figures presented in Table 8 can be used to estimate the amount of time over a one year period when certain parts of the band (depending on the activity) are at their busiest with the highest number of actively transmitting amateur stations. For those activities concentrated in the 1 296-1 297 MHz portion of the band and assuming the moon is visible for 24 hours (an over estimation) then the following can be deduced:

Total narrowband ‘busy hour’ activity period = 108 hours (1.2% of a year).

Total EME ‘busy hour’ activity period = 120 hours (1.4% of a year).

For the wideband activities taking place in the identified parts of the band plan, the following can be deduced:

– Total wideband ‘busy hour’ activity period = 120 hours (1.4% of a year).

Table 8 also shows that the number of active stations involved in the EME and wideband activities is considerably lower than those active in the narrow band activities.

Permanent installation stations present a different scenario when considering the operational time. Unmanned amateur radio stations are more or less in continuous operation, while manned stations only transmit intermittently. Propagation beacon and repeater station directories from a representative region can be consulted to develop the summary presented in Table 9.

TABLE 9

Permanent installation station operating periods in a typical year

Usage type	Annual operation	Active installations
Narrow-band propagation beacons	Transmitting continuously usually.	From 4 to 20 depending on the country reviewed. Region 1 = 88 in total.
Narrow-band repeaters	Low and only when activated on the input frequency by a user station. May transmit more regularly if a beacon mode is present.	From 9 to 19 depending on the country reviewed.
ATV repeaters (the users are usually home stations)	Low and only when activated on the input frequency by a user station in a random and sporadic manner. May transmit more regularly if a beacon mode is present.	From 10 to 18 depending on the country reviewed. 5 to 10 users within the local coverage area transmitting one at a time.

5.6 Activity factors of amateur transmitting stations in the 1 240-1 300 MHz band

Activity factor considers the amount of time that any particular station is transmitting during any operational period of activity. All applications involve two-way communication requiring periods of reception as well as transmission. It is usual practice for any home station or temporary portable station to spend more time receiving than transmitting.

Maximum Activity Factor for home station and temporary "portable" stations = 50% and typically less.

Any permanent installation station operating in a beacon mode will exhibit a 100% activity factor.

5.7 User density of amateur transmitting stations in the 1 240-1 300 MHz band

Home station and temporary "portable" station

– For narrowband activity periods the maximum density of transmitting stations = 0.0002 stations/km^2.

– For wideband activity periods the maximum density of transmitting stations = 0.0001 stations/km^2.

– For EME operations the maximum density of transmitting stations = 0.000013 stations/km^2.

Recognising that not all active stations may submit a record of their activities, a 33% increase has been added to the total active stations per scheduled operating period from Table 8.

Permanent installation

– For narrowband data and voice repeaters the average density of transmitting stations = 0.0003 stations/km^2.

– For wideband ATV repeaters, the average density of transmitting stations = 0.0001 stations/km^2.

– For propagation radio beacon stations, the average density of transmitting stations = 0.0001 stations/km^2.

In addition, it is noted that there is a tendency for more stations to be active in areas of higher population density. Therefore, a range of density values may be considered appropriate to more

accurately reflect the pattern of activity across a country. Based on a more detailed analysis the following active station density can be observed:

Home station and temporary "portable" station

– For narrow-band activity periods the maximum density of transmitting stations can range from 0.00006 to 0.0016 stations/km$^{2.}$

5.8 Table of transmitter characteristics and parameters (extracted from Recommendation ITU-R M.1732)

TABLE 10

Characteristics of amateur systems

Parameter	Value		
Applications	Morse on-off keying, PSK31, NBDP	Analogue voice systems	Data, digital voice and multimedia systems
Frequency range (1)	0.902-3.5 GHz	0.902-3.5 GHz	0.902-3.5 GHz
Necessary bandwidth and class of emission (emission designator)	150HA1A 150HJ2A 60H0J2B 250HF1B	2K70J3E 11K0F3E 16K0F3E 20K0F3E	2K70G1D 6K00F7D 16K0D1D 150KF1W 2M50G7W
Transmitter power (dBW) (2)	3 to 31.7	3 to 31.7	3 to 31.7
Feeder loss (dB)	1 to 6	1 to 6	1 to 6
Transmitting antenna gain (dBi)	10 to 42	10 to 42	10 to 42
Typical e.i.r.p. (dBW) (3)	1 to 45	1 to 45	1 to 45
Antenna polarization	Horizontal, vertical	Horizontal, vertical	Horizontal, vertical

(1) Amateur bands within the frequency ranges shown conform to RR Article **5**.

(2) Maximum powers are determined by each administration.

(3) May be limited by RR Article **5** in some cases.

TABLE 11

Characteristics of Earth-Moon-Earth (EME) systems

Parameter	Value
Frequency range (1)	1.24-3.5 GHz
Necessary bandwidth and class of emission (emission designator)	50H0A1A, 50H0J2A, 1K80F1B
Transmitter power (dBW) (2)	17 to 31.7
Feeder loss (dB)	1 to 4
Transmitting antenna gain (dBi)	25 to 40
Typical e.i.r.p. (dBW)	40 to 68
Antenna polarization	Horizontal, vertical, LHCP, RHCP

(1) Amateur bands within the frequency ranges shown conform to RR Article **5**.

(2) Maximum powers are determined by each administration.

Usage note: Main antenna beam direction can be assumed to be pointing above the horizon.

Emission note: EME increasingly employs digital "Weak Signal Modes" which are structured for very basic communications with low data rates and narrow bandwidth for best weak signal performance.

TABLE 12

Characteristics of amateur-satellite systems in the Earth-to-space direction

Parameter	Value
Frequency range (1)	1.24-3.5 GHz
Necessary bandwidth and class of emission (emission designator)	150HA1A, 150HJ2A
Necessary bandwidth and class of emission (emission designator) (2)	2K70J3E, 2K70J2E, 16K0F3E, 44K2F1D, 88K3F1D, 350KF1D,2M50G7W
Transmitter power (dBW) (3)	3 to 31.7
Feeder loss (dB)	1 to 2
Transmitting antenna gain (dBi)	10 to 42
Typical e.i.r.p. (dBW)	3 to 45
Antenna polarization	Horizontal, vertical, RHCP, LHCP

(1) Amateur bands within the frequency ranges shown conform to RR Article **5**.

(2) Any mode with a necessary bandwidth greater than 44 kHz may require higher e.i.r.p. values than shown in the Table to achieve a satisfactory link budget.

(3) Maximum powers are determined by each administration.

5.9 Band plan(s)

Amateur and amateur-satellite services band planning is achieved on a regional basis in order to take into account the regional differences with the frequency allocations. The current IARU recommended band plans for the frequency range 1 240-1 300 MHz across the three regions are summarized in the Table below.

The published band plans for each of the three regions may differ and may not be fully harmonised at the detailed level for every amateur service application. However, it is necessary to harmonise parts of the band for specific applications where these could involve inter-regional communications. This applies particularly to parts of the band recommended for narrowband weak signal applications.

The three recommended band plans across each of the IARU regions can be summarized according to Table 13.

TABLE 13

Global summary of amateur service and amateur-satellite-service IARU band plans

Frequency range (MHz)	Applications	Comments
1 240-1 260	Low bandwidth telegraphy, voice and data modes up to around 20 kHz. Amateur TV (ATV using Analogue or Digital technologies).	Organised into channelized groups for voice and data applications in some regions. One 16.75 MHz block is identified for ATV in this range in Region 1. Two 6 MHz blocks are identified for ATV in Region 2.
1 260-1 270	Satellite uplink band.	In Region 2 simplex ATV is also identified for experimental use in this range.
1 270-1 296	Low bandwidth telegraphy, voice and data modes up to around 20 kHz. Amateur TV (ATV using Analogue or Digital technologies).	Organised into channelized groups for voice and data applications in some regions. One 18.994 MHz block is identified for ATV in this range in Region 1. Two 6 MHz blocks are identified for ATV in Region 2.
1 296-1 297	Low bandwidth telegraphy, voice and data modes up to 3 kHz.	Focused on narrowband weak signal applications in all three regions including beacons. No channelization.
1 297-1 300	Low bandwidth voice and data modes up to around 20 kHz. Medium bandwidth data up to 150 kHz bandwidth.	Organized into channelized groups for voice and data applications in some regions.

Note to Table 13: The blocks identified for ATV use can accommodate a number of systems depending on the bandwidth occupied by the technology in use. The actual assignments are planned on a national basis.

5.10 IARU-R1 band plan for the frequency band 1 240-1 300 MHz

Table 14 provides the IARU Region 1 recommended usage of the allocations by operators in the amateur and amateur-satellite services. National versions of this band plan may slightly differ due to national frequency allocations.

TABLE 14

IARU Region 1 UHF Band plan for 1 240-1 300 MHz

Frequency (MHz)	Maximum bandwidth	Mode	Usage
1 240.000 1 240.500	2 700 Hz	All modes	Reserved for future
1 240.500 1 240.750	500 Hz	Telegraphy and MGM	Beacons (reserved for future)
1 240.750 1 241.000	20 kHz	FM Digital Voice	Reserved for the future
1 241.000 1 243.250	20 kHz	All Mode	1 242.025-1 242.250 repeater output (RS1-10) 1 242.275-1 242.700 repeater output (RS11-28) 1 242.725-1 243.250 Digital communications (RS29-50)
1 243.250 1 260.000	*	ATV/Digital ATV	1 258.150-1 259.350 repeater output
1 260.000 1 270.000	*	Satellite service	
1 270.000 1 272.000	20 kHz	All mode	1 270.025-1 270.700 repeater output (RS1-28) 1 270.725-1 271.250 Digital communications (RS29-50)
1 272.000 1 290.994	*	ATV/Digital ATV	
1 290.994 1 291.481	20 kHz	FM digital voice repeater input	RM1 (1 291.000) – RM19 (1 291.475) 25 kHz spacing
1 291.494 1 296.000	*	All modes	1 293.150-1 294.350 repeater input (R20-R68)
1 296.000 1 296.150	500 Hz	Telegraphy MGM	1 296.000-1 296.025 moon bounce 1296.128 PSK21 centre of activity
1 296.150 1 296.800	2 700 Hz	Telegraphy SSB MGM	1 296.200 narrowband centre of activity 1 296.400.1 296.600 linear transponder input 1 296.500 fax 1 296.600 narrowband centre of activity (MGM, RTTY) 1 296.600-1 296.700 linear transponder input 1 296.750-1 296.600 local beacons
1 296.800 1 296.994	500 Hz	Telegraphy MGM	beacons exclusive
1 296.994 1 297.481	20 kHz	FM digital voice repeater output	RM0 /1 297.000) – RM19 (1 297.475) 25 kHz spacing

TABLE 14 (*end*)

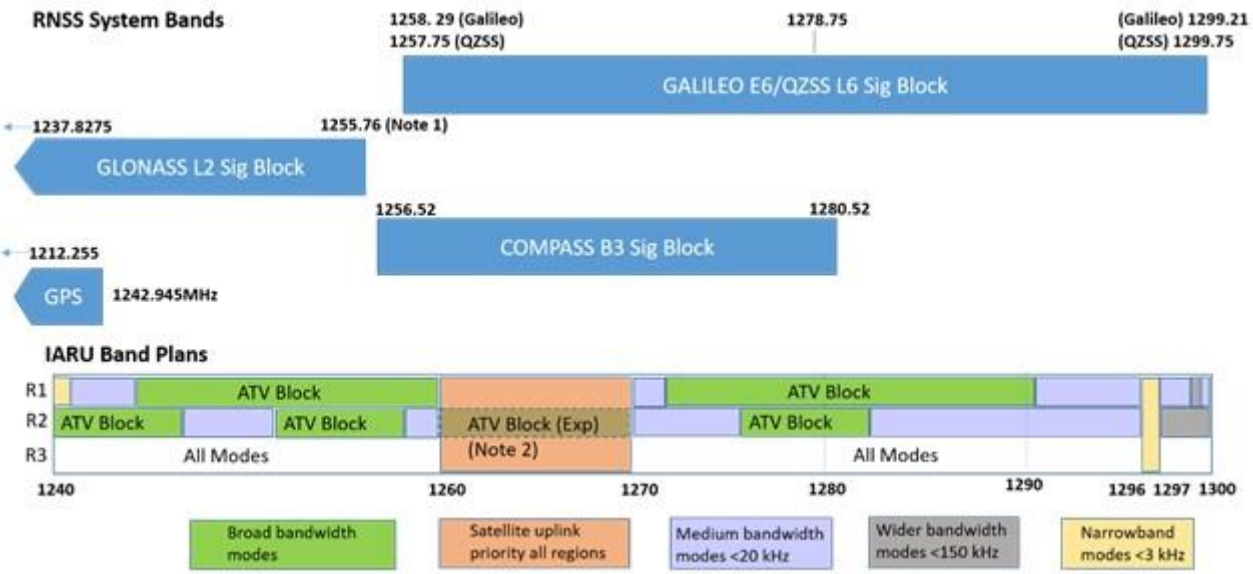
Frequency (MHz)	Maximum bandwidth	Mode	Usage
1 297.494 1 297.981	20 kHz	FM digital voice	1 297.500 SM20 1 297.500 centre of FM activity 1 297.725 digital voice calling frequency 1 297.900-1 297.975 Simplex FM internet gateways 1 297.975 SM39
1 298.000 1 299.000	20 kHz	All modes	General mixed analogue or digital use 25 kHz spacing 1 298.025 RS1 1 298.975 RS39
1 299.000 1 299.750	150 MHz	All modes	Arranged as 5x 150 kHz channels for high-speed DD use Centres: 1 299.075, 1 299.225, 1 299.375, 1 299.525, 1 299.675 (±75 kHz)
1 299.750 1 300.000	20 kHz	All modes	8x 25 kHz channels (available for FM/DV use) Centres 1 299.775-1 299.975

* Bandwidth limits according to national regulations.

6 Relationship between RNSS system frequencies in 1 240-1 300 MHz and amateur service application band plans

Figure 1 highlights the relationship between the various RNSS systems usage across the range 1 240-1 300 MHz and the IARU band plans.

FIGURE 1



NOTE 1 – GLONASS navigation receivers manufactured before 2006 can receive navigation signals in frequency band from 1 237.8275 MHz to 1 260.735 MHz.

NOTE 2 – In Region 2 ATV is also identified for experimental use in this range.

The frequency band 1 240-1 300 MHz is allocated worldwide to Earth exploration-satellite service (active), radiolocation service (RR No. **5.329** applies), the space research service and the radionavigation-satellite service (RNSS) in the space-to-Earth direction on a co-primary basis. The frequency band 1 240-1 300 MHz is also allocated worldwide to RNSS in the space-to-space direction on a co-primary basis. Additional services are allocated in some countries by footnotes RR No. **5.330** (fixed and mobile) and RR No. **5.331** (radionavigation).

Many RNSS systems and networks are operational in or adjacent to the 1 240-1 300 MHz portion of the 1 215-1 300 RNSS (space-to-Earth) and (space-to-space) primary allocations, as described in Recommendation ITU-R M.1787, and various types of RNSS receivers are used with those systems and networks. Report ITU-R M.2458 summarizes the RNSS applications in this frequency band.

The band 1 240-1 260 MHz is currently used by the Russian Federation GLONASS system, while the band 1 250-1 280 MHz is used by the Chinese COMPASS system and the band 1 260-1 300 MHz is used by the European Galileo system as well as the Japanese QZSS system. The same band is also planned to be used by the Korean KPS. Some transmissions of the United States' Global Positioning System in the 1 215-1 240 MHz band also extend above 1 240 MHz.

The frequency band 1 240-1 300 MHz is also allocated worldwide to the amateur service on a secondary basis and is being used for a range of applications. The amateur-satellite service (Earth-to-space) operates in the frequency band 1 260-1 270 MHz on a secondary basis under RR No. **5.282**.

The RNSS, amateur and amateur-satellite services characteristics and parameters are provided in the relevant ITU-R recommendations (see § 3 above). Those were completed by additional information from administrations on current and planned systems of the RNSS, amateur and amateur-satellite services to ITU-R. The full set of characteristics, parameters and protection criteria to be used for interference studies are given in §§ 4 and 5.

7 Summary

The amateur and amateur-satellite service characteristics provided in this Report have been used in Report ITU-R M.2513, which addresses the protection of the primary radionavigation-satellite service (space-to-Earth) by the secondary amateur service in the frequency band 1 240-1 300 MHz and the amateur-satellite service (Earth-to-space) operating in the frequency band 1 260-1 270 MHz under No. **5.282** of the Radio Regulation.