

4 IARU REGION 1 VHF/UHF/Microwaves BANDPLANS

On the following pages are the official IARU Region 1 bandplans currently valid for the 50 MHz, 70 MHz, 145 MHz, 435 MHz and the microwave bands are set out. In accordance with the policy outlined in section 3.1, only carefully considered modifications and/or additions have been made during the tri-annual IARU Region 1 Conferences.

At the IARU Region 1 Conference in Cefalu (1984) a 50 MHz bandplan was adopted for use in countries within the European part of Region 1 where amateurs had obtained a frequency allocation or assignment in the 50 MHz band. As an appreciable number of countries within the European part of Region 1 had obtained or expected to obtain such an allocation by the end of 1989, at the IARU Region 1 Conference in Torremolinos (1990) the first version of an official IARU Region 1 bandplan for use in that part of Region 1 where the 50 MHz allocation does not exceed 52.000 MHz was adopted. At the IARU Region 1 Conference in Tel Aviv (1996) the bandplan was slightly amended in order to reflect practical experiences. The IARU Region-1 conference in Sun City (2011) further revised this.

At the IARU Region 1 Conference in San Marino (2002) it appeared that a significant number of DXCC countries (e.g. EI, G, GD, GI, GJ, GM, GU, GW, S5, ZB, ZS, 5B4, ZC4) had got access to the 70 MHz band and it was decided to add the bandplan for that band.

Regarding amateur-satellite bandplans, the following was decided at the IARU Region 1 Conference in Warsaw (1975):

That IARU Region 1 adopts the bandplans recommended by the sponsors of each satellite system, e.g. by AMSAT for OSCAR-7, but also informs sponsors that such bandplans must be kept simple and that in the opinion of IARU Region 1 in each case provisions should be made to segregate Telegraphy from telephony.

The currently valid satellite bands, together with some data on amateur satellites, can be found in the amateur satellite chapter.

The appearance of manned space stations with an amateur station on board has led to the allocation of FM channel frequencies. In Vienna 1995 the former 145.200/145.800 MHz frequency pair was allocated.

The following general recommendations regarding the promotion of bandplans have been adopted/re-affirmed at various IARU Region 1 Conferences:

- a. VHF Managers should give maximum publicity to the adopted bandplans. In view of the many newcomers, regular repetition of the publication of the bandplans is advisable.
- b. Member Societies, and particularly their VHF Managers or VHF Committees, should strongly promote adherence to the adopted bandplans by all VHF/UHF/Microwaves amateurs in their country.

It will be noted in the following bandplans that the accommodation of the narrow-band modes in several bands is quite similar and is modelled after the plans for the 145 MHz band which existed before the 1996 Tel Aviv conference.

The narrow-band modes parts of the higher bands are respectively:

432	-	434	MHz	
1296	-	1298	MHz	
2320	-	2322	MHz	alternative 2304 - 2306 or 2308- 2310 MHz
3400	-	3402	MHz	
5668	-	5670	MHz	
5760	-	5762	MHz	
10368	-	10370	MHz	alternative 10450 - 10452 MHz
24048	-	24050	MHz	
24192	-	24194	MHz	till 31-12-2003 (San Marino 2002)
47.000	-	47.002	GHz	
75.500	-	76.000	GHz	(DAVOS 2005)
77.500	-	77.501	GHz	
122.250	-	122.251	GHz	
134.000	-	134.001	GHz	
248.000	-	248.001	GHz	

Note: As it cannot be expected that FM repeater systems will become operational at the microwave bands above 77 GHz the NB segment in those bands is currently limited to 1 MHz

At the Conference in San Marino it was decided to change the basic set-up of the bandplan. Till then the bandplans show two columns (plus a column for the frequency segments):

IARU Region 1 bandplan	Usage
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The left column designation is self-explanatory. The right column contains meeting/calling frequencies, agreed upon for the convenience of the VHF/UHF/Microwave amateurs practising specific modes of communication. These frequencies are not part of the adopted IARU Region 1 bandplan and, though in the normal amateur spirit other operators should take notice of these agreements, no right on reserved frequencies can be derived from a mention in the right-hand column.

The San Marino conference started to change this, beginning with the 50 MHz and 145 MHz bands. The other bands to follow at a later moment. In this new planning there are three columns:-

maximum bandwidth	Mode	Usage
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The maximum bandwidth determines the maximum spectral width (-6 dB points) of all emissions allowed in a segment. **The mode** indicates the modulation methods (e.g. telegraphy, telephony, MGM, etc) allowed in a segment. M(achine) G(enerated) M(ode) indicates those transmission modes relying fully on computer processing such as RTTY, AMTOR, PSK31, FSK441 and the like. **The usage** column indicates the main usage (sometimes country dependant) of a segment. In case only one application is allowed, the word 'exclusive' is added.

The allocation of frequency segments to the various modes of operation in the IARU Region 1 bandplans is subject to the following condition:

The allocation of sub-bands in the IARU Region 1 bandplans allows the indicated category of users to employ any frequency within that sub-band, provided that no appreciable energy falls outside that sub-band. Users must therefore take into account the bandwidth of their sidebands when selecting an operating frequency. (de Haan, 1993)

Attention is drawn to the "Principles of Bandplanning"

4.1 CHANNEL DESIGNATION SYSTEM FOR VHF/UHF FM CHANNELS

Although the FM channels can be referenced by their centre frequency, a numbering/naming system for FM channels in the 50 MHz, 145 MHz and 435 MHz is recommended (Tel Aviv 1996)

Note: For the microwave bands the "old" numbering system as indicated in the bandplan still is recommended.

The system is based upon the following principles:

- 1) For each band, there should be a "designator letter":
51 MHz : **F**
145 MHz : **V**
435 MHz : **U**
- 2) Each designator letter should be followed by two (for 50 and 145 MHz) or three (for 435 MHz) digits which indicate the channel.
- 3) If a channel is used as a repeater *output*, its designator should be preceded by the letter "**R**".
- 4) In the 50 MHz band the channel numbers start at F00 for 51.000 MHz and increment by one for each 10 kHz.
- 5) In the 145 MHz band the channel numbers start at V00 for 145.000 MHz and increment by one for each 12.5 kHz.
- 6) In the 435 MHz band the channel numbers start at U000 for 430 MHz and increment by one for each 12.5 kHz.

Examples

F51	Simplex frequency 51.510 MHz
RF79	Repeater with output frequency 51.790 MHz
V40	Simplex frequency 145.500 MHz (the old S20)
RV48	Repeater with output frequency 145.600 MHz (the old R0)
U280	Simplex frequency 433.500 MHz (the old SU20)
RU002	Repeater with output frequency 430.025 MHz (the old FRU1)
RU242	Repeater with output frequency 433.025 MHz (the old RB1)
RU368	Repeater with output frequency 434.600 MHz (the old RU0)
RU692	Repeater with output frequency 438.650 MHz (the old R70)

Notes:

- In the 50 MHz band no FM channels are defined below 51 MHz. (See also footnote e to the 50 MHz bandplan.
- In the 145 MHz band FM channels only exist for the segment with the channel frequencies 145.000 -- 145.800 MHz (the latter channel may be used for a downlink by manned space stations)
- In the 435 MHz band no FM channels are defined in the segment 432.000 MHz - 433.000 MHz

4.2 50 - 52 MHz BANDPLAN

Frequency	Maximum Bandwidth	Mode	Usage
50.000 50.100	500 Hz	Telegraphy exclusive (except Beacon Project)	50.000 - 010 Region-1 * 50.010 - 020 Region-2 * 50.020 - 030 Region-3 * * Reserved for future Synchronised Beacon Project (b) 50.050 CW future International centre of activity 50.090 CW Intercontinental centre of activity
50.100 50.200 50.200	2700 Hz	SSB Telegraphy	International preferred 50.100 - 130 Intercontinental section 50.110 Intercontinental centre of activity(c) 50.130 - 200 international section 50.150 International centre of activity
50.300 50.300	2700 Hz	SSB Telegraphy	General usage 50.285 for crossband
50.300 50.400 50400	2700 Hz	MGM Narrowband Telegraphy	50.305 PSK Centre of activity 50.310 - 320 EME centre of activity 50.320 - 380 MS centre of activity
50400 50.500	1000 Hz	MGM Telegraphy	Beacons exclusive
50.500 52.000	12 kHz	All Modes	50.510 SSTV 50.540 - 580 Simplex FM Internet Voice Gateways 50.550 Image frequency 50.600 RTTY 50.620 - 750 Digital communications 50.630 DV calling 51.210 - 390 FM/DV Repeater Inputs, 20 kHz spacing (e) 51.410 - 590 FM/DV Simplex (f) 51.510 FM calling frequency 51.810 - 990 FM repeaters output channels, 20 kHz spacing (e)

DV = Digital Voice

4.2.1 Notes: BANDPLAN

This bandplan, first adopted at the IARU Region 1 Conference in Torremolinos (1990) and revised at the 1996 Tel Aviv conference, the 2002 San Marino Conference, and the 2011 Sun City Conference is recommended for use in those countries in the European part of Region 1 which allow amateurs to operate in this part of the radio spectrum. In many countries in the African part of Region 1 (see footnotes accompanying the ITU frequency allocation table) the 50 - 54 MHz band is allocated to the Amateur Service on a primary basis. These Countries may refer to the SARL Bandplan.

Footnotes:

- a. deleted

4.2.2 Notes: Usage

The following notes are referring to the Usage column in the bandplan. As already set out in the introduction to section 3, in the right amateur spirit operators should take notice of these agreements which are made for operating convenience, but no right to reserved frequencies can be derived from a mention in the Usage column or from the following notes.

Footnotes:

- b. 50.0-50.1MHz is currently shared with Propagation Beacons. See 11.3
- c. The intercontinental DX calling frequency 50.110 MHz should not be used for calling within the European part of Region 1 at any time.
- d. deleted.
- e. For the specification of FM telephony see section 8.2
- f. This segment is for simplex use only with no Digital Voice gateways permitted. Embedded data traffic is allowed along with Digital Voice. DV users should check that the channel is not in use by other modes

For the numbering of FM telephony channels see 4.1

In those countries within the European part of IARU Region 1 where it is allowed to set up FM repeaters on 50 MHz, the indicated channels are recommended in order to establish a commonality.

In those countries where the National Authorities do not permit repeaters to operate with output frequencies above 51 MHz, repeater output frequencies may be 500 kHz below the repeater input frequencies. (Tel Aviv 1996)

4.3 70.0 - 70.5 MHz BANDPLAN

Frequency (MHz)	Maximum Bandwidth	MODE	Usage
70.000	1000Hz	TELEGRAPHY MGM	Coordinated Beacons(a)
70.090			
70.090	1000Hz	BEACONS	temporary and personal beacons
70.100			
70.100	2700Hz	TELEGRAPHY SSB MGM	70.185 Crossband center of activity 70.200 Telegraphy/SSB calling 70.250 MS calling
70.250			
70.250	12kHz	AM / FM (b)	70.260 AM/FM calling 70.270 MGM centre of activity
70.294			
70.294	12kHz	FM CHANNELS, 12.5 kHz spacing	70.3125 Digital communications 70.3250 Digital communications 70.4500 FM calling 70.4625 70.4750 70.4875 Digital communications
70.500			

The 70MHz band is increasingly recognised as being appropriate for amateur allocations. In the CEPT area this progress is now recognised in the European Table of Frequency Allocations by Footnote EU9 which states:

EU9: **CEPT administrations may authorise all or parts of the band 69.9-70.5 MHz to the amateur service on a secondary basis**

In addition it is worth noting that there is some experimental access on a national basis in the range 69.90 - 70.0MHz in cases where 70MHz is not available.

References:

- [1] European Allocation Table: <http://www.erodocdb.dk/Docs/doc98/official/pdf/ercrep025.pdf>
- [2] <http://www.70MHz.org> has a useful list of current allocations and permits

4.3.1 Notes: BANDPLAN

Footnotes:

- a. Refer to Beacons Chapter for coordination of beacons (Section 11)
- b. Usage by operators may vary due to restrictions on national allocations

4.3.2 Notes: Usage

Footnotes:

4.4 144 - 146 MHz BANDPLAN

Frequency (MHz)	Maximum Bandwidth	MODE	USAGE
144.000	2700Hz	ALL MODE	Satellites (downlinks only) (s) (Varna 2014)
144.025			
144.025	500Hz	Telegraphy (a) EME)	144.050 Centre of activity 144.100 Random MS(m)
144.110			
144.110	500Hz	Telegraphy MGM	144.110–144.160 EME MGM (i) 144.138 PSK31 centre of activity
144.150			
144.150	2700Hz	Telegraphy, SSB, MGM	144.160-144.180 alternative MGM Allocation 144.170 alternative MGM calling frequency
144.180			
144.180	2700Hz	Telegraphy & SSB	144.195-144.205 Random MS SSB (m) 144.300 SSB Centre of activity
144.360			
144.360	2700Hz	Telegraphy, SSB, MGM	144.370 FSK441 Random calling(m)
144.399			
144.400	500Hz	Telegraphy MGM	Beacons exclusive (b)
144.491			
144.500	20kHz	All mode (f)	144.500 Image mode centre (SSTV, Fax,...) 144.600 Data centre of activity(MGM,RTTY,...) 144.750 ATV talk back
144.794			
144.794	12kHz	MGM (h) Digital Communications	144.800 APRS 144.8125 DV Internet voice gateway 144.8250 DV Internet voice gateway 144.8375 DV Internet voice gateway 144.8500 DV Internet voice gateway 144.8625 DV Internet voice gateway
144.9625			

144.975 145.194	12kHz	FM / Digital voice	Repeater Input exclusive (c)
145.194 145.206	12kHz	FM / Digital voice (i)	Space communication (p)
145.206 145.5625	12kHz	FM / Digital voice (i)	145.2375 FM Internet Voice Gateway 145.2875 FM Internet Voice Gateway 145.3375 FM Internet Voice Gateway 145.375 digital voice calling 145.500 FM calling
145.5625 145.5750	12kHz	FM / Digital voice	Repeater Output exclusive (c, d)
145.7935 145.794	12kHz	FM / Digital voice (i)	Space communication (p)
145.794 145.806	12kHz	FM / Digital voice (i)	Space communication (p)
145.806 146.000	12kHz	ALL MODE (e)	Satellite exclusive

4.4.1 Notes: BANDPLAN

The following notes are part of the officially adopted IARU Region 1 bandplan, and all member societies should strongly promote adherence to the recommendations made in these notes.

General:

- i. In Europe no input or output channels of telephony repeaters shall be allowed to operate between 144.000 and 144.794 MHz.
- ii. Except in the part of the band allocated to the Amateur Satellite Service and the linear transponders it is not allowed to use input- or output frequencies in the 145 MHz band for repeaters with in- or output in other amateur bands (Miskolc-Tapolca 1978, San Marino 2002).

iii. Deleted (Vienna 2016)

Footnotes:

- a. Telegraphy is permitted over the whole band, except in the beacon band; Telegraphy exclusive between 144.000 - 144.110 MHz. (except satellite output downlink to earth)
- b. Refer to Beacons Chapter for coordination of beacons in the beacon sub-band Section-11
- c. For technical standards on FM and repeaters see section-8

If there is a real need for more repeater channels (see section-10), it is recommended that Societies or Repeater Groups consider setting up a repeater system on the higher frequency band(s).

Further to this subject the following recommendation was adopted in. De Haan, 1993:

Deleted (Vienna 2016)

For the numbering of FM telephony channels, see annex 2 to this section.

- d. Established simplex frequencies on repeater output channels may be retained.
- e. In view of the important public relations aspect of amateur satellite activities, it was decided at the IARU Region 1 Conference in Miskolc Tapolca (1978) that:
 - i. AMSAT will be allowed to use the band 145.8 - 146.0 MHz for amateur satellite activity.
 - ii. This decision was re-confirmed at the IARU Region 1 Conference in Brighton (1981).
 - iii. see also footnote p
- f. No unmanned stations shall use the all-mode segment, except for linear transponders and ARDF beacons. (Tel Aviv 1996, San Marino 2002)
- g. Attention is drawn to section 1.1. point iii of these Bandplan notes!
- h. Unmanned packet radio stations and digital access points are allowed in the segment 144.800 -144.9625 MHz, provided they are fully compatible with 12.5kHz channel spacing. Any other unmanned packet radio outside of this frequency range must cease operation.
- i. This segment is for simplex use only with no Digital Voice gateways. Embedded data traffic is allowed along with digital voice. Digital Voice users should check that the channel is not in use by FM.
- j. Amateur Satellite Linear Transponder down-links. Subject to agreement with Region-2 and Region-3

4.4.2 Notes: Usage

The following notes are referring to the Usage column in the bandplan. As already set out in the introduction to section IIc, in the right amateur spirit operators should take notice of these agreements which are made for operating convenience, but no right to reserved frequencies can be derived from a mention in the Usage column or from the following notes.

Footnotes:

- k. Not used
- l. Not used
- m. See procedures set out in section 7.4
- n. Deleted (Varna 2014)
- o. Not used
- p. For FM voice communications with special stations like manned spacecraft it is recommended to use 145.200 MHz for simplex operation or 145.200/145.800 MHz for split-channel operation (Vienna 1995/Tel Aviv 1996).
- q. It is recognised that in the IARU Region 1 rules for the Championships in Amateur Radio Direction Finding (ARDF) competitions, the frequencies for the unmanned beacons are in the segment 144.500 – 144.900 MHz. These beacons run low power and are on the air only during ARDF events. (Davos 2005)
- r. No transmission shall be made below 144,0025 MHz* (Varna 2014)
**so that a necessary guard band is provided at the bottom edge*

4.4.3 National usage notes

Some countries have existing use at:

- 144.660-144.690 Linear Transponder Inputs
- 144.630-144.660 Linear Transponder Outputs

4.5 430 - 440 MHz BANDPLAN

Frequency MHz	Maximum Bandwidth	MODE	USAGE	
430.000 SUB-REGIONAL (national bandplanning) (d)	20kHz	ALL MODES	430.025 - 430.375	FM repeater output-channel freqs (F/PA/ON), 12,5 kHz spacing, 1.6 MHz shift (f)
			430.400 - 430.575	Digital communication link channels (g) (j)
			430.600 - 430.925	Digital communications repeater channels (g) (j) (l)
			430.925 - 431.025	Multi mode channels (j) (k) (l)
			431.050 - 431.825	Repeater input channel freqs (HB/DL/OE), 25 kHz spacing, 7.6 MHz shift (f)
431.975			431.625 - 431.975	Repeater input channel freqs (F/PA/ON), 12.5 kHz spacing, 1.6 MHz shift (p)
432.000 432.025	500Hz	Telegraphy (a)		EME
432.025 432.100	500Hz	Telegraphy (a) MGM	432.050 432.088	Telegraphy centre of activity PSK31 centre of activity
432.100 432.400	2700Hz	Telegraphy SSB MGM	432.200 432.350 432.370	SSB centre of activity Microwave talkback centre of activity FSK441 random calling
432.400 432.490	500Hz	Telegraphy, MGM		Beacons exclusive (b)
432.500 432.975	12kHz	ALL MODES	432.500	NEW APRS FREQUENCY REPEATER INPUT REGION 1 STANDARD, 25 kHz spacing, 2 MHz shift (Channel freq 432.600 - 432.975MHz) In the UK repeater OUTPUT channels.
433.000 433.375	12 kHz	FM Digital voice Repeater (p)		REPEATER INPUT REGION 1 STANDARD, 25 kHz spacing, 1.6 MHz shift (Channel freq 433.000--433.375 MHz) I

433.400	12 kHz	FM Digital voice (f) (o)	433.400 433.450 433.500	SSTV(FM/AFSK) digital voice calling FM calling
433.575			SIMPLEX CHANNELS, 25 kHz spacing, (Channel freq 433.400 -- 433.575 MHz)	
433.600	20kHz	ALL MODES	433.625 - 433.775	Digital communications channels (g) (h) (i)
434.000			434.000	Centre frequency of digital experiments as defined on note (m)
434.000	12kHz (c)	ALL MODES ATV (c)	434.450 - 434.575	Digital communications channels (by exception !!) (i)
434.594			REPEATER OUTPUT (region 1 system), 25 kHz spacing, 1.6 MHz shift, (Channel freq 434.600 -- 434.975 MHz)	
434.594	12kHz (c)	ALL MODES		In the UK repeater INPUT channels
ATV (c) & FM 434.981				
435.000	20kHz (c)	Satellite service & ATV (c)		
438.000	20kHz (c)	ALL MODES	438.025 - 438.175	Digital communications channel frequency (g)
ATV (c) & SUB- REGIONAL (national bandplanning) (d)			438.200 - 438.525	Digital communications repeater channels (g) (j) (l)
			438.550 - 438.625	Multi-mode (j) (k) (l)
			438.650 - 439.425	Repeater output channels (HB/DL/OE), 25 kHz spacing, 7.6 MHz shift, (f) (p)
440.000			439.800 -- 439.975	Digital communications link channels (g) (j)

4.5.1 Notes: BANDPLAN

The following notes are part of the officially adopted IARU Region 1 bandplan, and all member societies should strongly promote adherence to the recommendations made in these notes.

- a) In Europe no input or output channels of telephony repeaters shall be allowed to operate between 432 and 433 MHz (From 1-1-2004 those frequencies are between 432.000 and 432.600 MHz)
- b) FM telephony channels and Repeaters are specified in chapter 8.8.4
- c) **ATV Repeater outputs are not permitted in the 435MHz band (Varna 2014)**

Footnotes

- a. Telegraphy is permitted over the whole narrow-band DX part of the band; Telegraphy exclusive between 432.000 - 432.100 MH. PSK31, however, can be used as well in this segment
- b. Refer to Beacons Chapter for coordination of beacons in the beacon sub-band
See Section 11.1.1
- c. ATV operators should be encouraged to use the microwave allocations where available, but may continue to use the 435 MHz band. In case of interference between ATV and the Amateur Satellite Service, the Satellite Service **shall** have priority.

Any remaining legacy wideband ATV usage in the 435MHz band should be phased out in favour of narrower bandwidth, more compatible, modes such as DATV or SATV

For ATV transmissions National societies should provide guidance to their members on the exact frequencies to be used, with due consideration of the interests of other users (Varna 2014)

- d. The words "Sub-regional (national) bandplanning" appearing in IARU Region 1 VHF/UHF/Microwave bandplans mean the following:

In bands and sub-bands not available throughout Region 1, band-planning should be coordinated on a sub-regional basis between the countries where those bands and sub-bands are allocated to the Amateur Service. The words "national bandplanning" refer to bands/segments which are available only in a single country (such as the 70 MHz band allocation), or only in a few widely separated countries.(Torremolinos 1990)
- e. Not used
- f. Embedded data traffic is allowed along with digital voice. Digital Voice users should check that the channel is not in use by other modes

4.5.2 Notes: Usage

The following notes are referring to the Usage column in the bandplan. As already set out in the introduction to section IIc, in the right amateur spirit operators should take notice of these agreements which are made for operating convenience, but no right to reserved frequencies can be derived from a mention in the Usage column or from the following notes (except where 'exclusive' is mentioned).

Footnotes

- f. The HB/DL/OE wide-shift repeater system, already in use for a long time, is valuable with a view to a better utilisation of the whole band. Hence IARU Region 1 endorses the system. This also applies for the French repeater channel system, also adopted by the Netherlands and Belgium, which IARU Region 1 supports as a useful measure to fill a hitherto unused part of the band. For the numbering of FM telephony channels see 4.1.
- g. In the Usage section of the 435 MHz bandplan the following frequency segments have been designated for digital communications:
 - i. 430.544 - 430.931 MHz Extension of the 7.6 MHz repeater system input
for digital communication
438.194 - 438.531 MHz Output channels for the above
 - ii. 433.619 - 433.781 MHz
438.019 - 438.181 MHz
 - iii. 430.394 - 430.581 MHz For digital communication links
439.794 - 439.981 MHz For digital communication links

With due regard to the band allocated to the Amateur Service by the national Administration, the interests of other users, possible interference from e.g. ISM, the specific digital technique or system to be accommodated etc., a sub-regional, or national choice may be made within the above segments.

- h. In those countries where 433.619 - 433.781 MHz is the only segment of the 435 MHz band available for digital communications, modulation techniques requiring a channel separation exceeding 25 kHz should not be used. If different or incompatible use of this part of the frequency spectrum is contemplated in neighbouring countries, this use should be coordinated between the countries concerned with the aim of avoiding harmful interference.
- i. On a temporary basis, in those countries where 433.619 - 433.781 MHz is the only segment of the 435 MHz band available for Digital Communications:
 - i. Channels with centre frequencies 432.500, 432.525, 432.550, 432.575, 434.450, 434.475, 434.500, 434.525, 434.550 and 434.575 may be used for digital communications.
 - ii. Use of these channels must not interfere with linear transponders.
 - iii. Modulation techniques requiring a channel separation exceeding 25 kHz must not be used on these channels. (De Haan, 1993)
- j. At the IARU Region 1 Conference in Torremolinos (1990) the following recommendation was adopted regarding the segments for repeaters and links, shown in footnote g:

For a repeater/link to be installed within 150 km of a national border, the member society should co-ordinate the frequency allocation and the technical (system) data with the member societies in neighbouring countries. Special attention should be paid to the common good practice of using directional antennas and the minimum power necessary.

As a matter of course this agreement is also valid for any link experiments carried out on the multi-mode channels in the segment 438.544--438.631 MHz. (De Haan, 1993).
- k. These multi-mode channels are to be used for experimenting with new transmission technologies (De Haan, 1993)
- l. In the United Kingdom the use of low-power speech repeaters on repeater channels in the segment 438.419--438.581 is allowed. Where necessary, frequencies will be coordinated with neighbouring countries (De Haan, 1993).
- m. Experiments using wide band digital modes may take place in the 435 MHz band in those countries that have the full 10 MHz allocation. These experiments should be in the all modes section around a frequency of 434 MHz, use horizontal polarisation and the minimum power required. (Tel Aviv 1996)
- n. Common frequencies for Simplex (FM) Internet voice gateways are:
433.950, 433.9625, 433.975, 433.9875, 434.0125, 434.025, 434.0375, 434.050 MHz
(Cavtat 2008)
- o. All Voice repeater channels may use FM or Digital Voice modes. (Cavtat 2008)

4.5.3 National usage notes

p. Some countries have existing use at:

432.500-432.600	Linear	Transponder	Inputs
432.600-432.800	Linear	Transponder	Outputs
439.9875	POCSAG (Paging)		

q. In countries without access to the full 70 cm band, the following 12,5 kHz repeater channels with a 1.6 MHz separation between uplink and downlink can be implemented:

- a. Input Frequencies (uplink) 431,225 – 431,600 MHz
- b. Output Frequencies (downlink) 432,825 – 433,200 MHz

This needs international coordination if necessary

4.5.4 DATV & SATV in the 435 MHz Band (Varna 2014)

As the national 70cm allocations vary considerably, it is not possible in the VHF Handbook to specify exact centre frequencies for DATV/SATV operation – but it should be where its bandwidth is compatible with other uses.

If the 435-438MHz amateur satellite section is used for ATV, it shall be on the following basis:-

- ATV (like Voice) Repeater outputs are not permitted
- ATV Internet gateways are not permitted
- ATV Repeater inputs are permitted (eg for cross band usage)
- ATV Simplex usage is permitted
- Transmission times by ATV users should be as short as possible

Any usage should also be compliant with the Region 1 Technical Recommendations for DATV/SATV and in particular the maximum bandwidth

Centre frequencies of ATV usage in the amateur satellite section shall be chosen to place its bandwidth at the upper end of the amateur satellite section

4.6 1240 - 1300 MHz BANDPLAN

Frequency MHz	Maximum Bandwidth	MODE	USAGE	
1240.000 1240.500	2700 Hz	ALL MODE	(reserved for future)	
1240.500 1240.750	500Hz	Telegraphy MGM	Beacons (reserved for future)	
1240.750 1241.000	20kHz	FM Digital voice	(reserved for future)	
1241.000 1243.250	20kHz	ALL MODE	1240.000-1241.000 1242.025-1242.250 1242.275-1242.700 1242.725-1243.250	Digital communications Repeater output, ch. RS1 - RS10 Repeater output, ch. RS11 - RS28 Digital communications, ch. RS29 - RS50
1243.250 1260.000	(d)	ATV Digital ATV	1258.150-1259.350	Repeater output, ch. R20 - R68
1260.000 1270.000	(d)	Satellite Service		
1270.000 1272.000	20kHz	All Mode	1270.025-1270.700 1270.725-1271.250	Repeater input, ch. RS1 -- RS28 Digital communication, ch. RS29 -- RS50
1272.000 1290.994	(d)	ATV Digital ATV		
1290.994 1291.481	20kHz	FM Digital voice Repeater INPUT	RM0 (1291.000) -- RM19 25kHz spacing RM19 (1291.475)	
1291.481 1296.000	(d)	ALL MODES	1293.150-1294.350 R20 (1293.150) R68 (1294.350)	Repeater input,
1296.000 1296.150	500Hz	Telegraphy MGM	1296.00-1296.025 1296.138	Moonbounce PSK31 centre of activity
1296.150 1296.800	2700Hz	Telegraphy SSB MGM	1296.200 1296.400-1296.600 1296.500 1296.600 1296.600-1296.700 1296.750-1296.800	Narrow-band centre of activity Linear transponder input Image center (SSTV, Fax etc) Narrowband Data center (MGM, RTTY,...) Linear transponder output Local Beacon (10W ERP max)

1296.800	500Hz	Telegraphy MGM	Beacons exclusive (b)
1296.994			
1296.994	20kHz	FM Digital voice Repeater OUTPUT	RM0 (1297.000) 25 KHz spacing RM19 (1297.475)
1297.481			
1297.494	20kHz	FM (c) Digital Voice (e)	SM20 (1297.500) (25 KHz spacing - SIMPLEX) 1297.500 FM center of activity 1297.725 Digital Voice calling (25 KHz spacing - SIMPLEX) 1297.900-1297.975 Simplex FM Internet voice gateways SM39 (1297.975)
1297.981			
1298.000	20kHz	All modes	General mixed analogue or digital use in 25 kHz channels 1298.025MHz (RS1) 1298.975MHZ (RS39)
1299.000			
1299.000	150kHz	All modes	Arranged as 5 x150kHz channels for high speed Digital Data (DD) usage: Centres: 1299.075, 1299.225, 1299.375, 1299.525, 1299.675 MHz (+/- 75kHz)
1299.750			
1299.750	20kHz	All modes	8x25kHz channels (available for FM/DV use) : Centres: 1299.775-1299.975
1300.000			

4.6.1 Notes: BANDPLAN

The following notes are part of the IARU Region 1 bandplan for this band, originally adopted during the IARU Region 1 Conference at Noordwijkerhout (1987), and all member societies should strongly promote adherence to the recommendations made in these notes.

At the IARU Region-1 Conference at Cavtat (2008), Recommendation CT08_C5_27 was adopted which designated the 1240.0-1240.75MHz segment as an alternative narrowband section and makes a series of recommendations for replanning other parts of the band for DATV and Digital Voice & Data

Footnotes

- a. deleted
- b. Refer to Beacons Chapter for coordination of beacons in the beacon sub-band Section 11
- c. In countries where 1298 - 1300 MHz is not allocated to the Amateur Service (e.g. Italy) the FM simplex segment may also be used for digital communications.
- d. Bandwidth limits according to national regulations.
- e. Embedded data traffic is allowed along with digital voice. Digital Voice users should check that the channel is not in use by other modes

4.6.2 Notes: Usage

The following note refers to the Usage column in the bandplan. As already set out in the introduction to section IIc, in the right amateur spirit operators should take notice of these agreements which are made for operating convenience, but no right to reserved frequencies can be derived from a mention in the Usage column.

During contests and band openings, local traffic using narrow-band modes should operate between 1296.500 - 1296.800 MHz.

4.7 2300 -2450 MHz BANDPLAN

Frequency	Maximum Bandwidth	Mode	Usage
2300.000 SUB-REGIONAL (national) BANDPLANNING (a)	20 kHz	ALL MODES	2304 - 2306 Narrow band segment in countries where the 2320-2322 segment is not available 2308 - 2310 Narrow band segment in HB
2320.000 2320.000	500 Hz	TELEGRAPHY EXCLUSIVE (c)	2320.000-2320.025 EME 2320.138 PSK31 centre of activity
2320.150 2320.150	2700 Hz	TELEGRAPHY/ SSB (c)	2320.200 SSB centre of activity 2320.750-2320.800 Local Beacons (10W ERP max)
2320.800 2321.000		Telegraphy MGM	BEACONS EXCLUSIVE (c)
2321.000 2322.000	20 kHz	FM and Digital Voice	VOICE SIMPLEX & REPEATERS (b)
2322.000 2400.000		All Modes (b)	2322.000-2355.000 ATV 2355.000-2365.000 Digital communications 2365.000-2370.000 Repeaters 2370.000-2392.000 ATV 2392.000-2400.000 Digital communications
2400.000 2450.000		Amateur Satellite Service	2427.00 - 2443.00 ATV if no satellite uses this segment

4.7.1 Notes: BANDPLAN

- a. The words "Sub-regional (national) bandplanning" appearing in IARU Region 1 VHF/UHF/Microwave bandplans mean the following:

In bands and sub-bands not available throughout Region 1, band-planning should be coordinated on a sub-regional basis between the countries where those bands and sub-bands are allocated to the Amateur Service. The words "national bandplanning" refer to bands which are available only in a single country (such as the 70 MHz band allocation), or only in a few widely separated countries. (Torremolinos 1990)

- b. In countries where the ALL MODES segment 2322 - 2400 MHz is not allocated to the Amateur Service, the FM SIMPLEX & REPEATER segment 2321 - 2322 MHz may be used for digital data transmissions. For the specification of FM see section VIb
- c. In countries where the narrow-band segment 2320 - 2322 MHz is not available, the following alternative narrow-band segments can be used:
2304 - 2306 MHz
2308 - 2310 MHz

Refer to Beacons Chapter for coordination of beacons in the beacon sub-band Section 11.1.1

4.8 3400 - 3475 MHz BANDPLAN

Frequency	Maximum Bandwidth	Mode	Usage
3400.000	500 Hz	Telegraphy MGM	3400.100 Centre of activity and EME (b)
3400.800			3400.750-3400.800 Local Beacons (d)
3400.800		MGM Telegraphy	BEACONS ONLY (e)
3400.995			
3401.000	2700 Hz	ALL MODE	
3402.000			
3402.000		ALL MODE	SATELLITE DOWNLINKS (a) (c)
3410.000			
3410.000		ALL MODE	
3475.000			

4.8.1 Notes: BANDPLAN

Footnotes:

- CEPT Footnote EU17 permits Amateur Service in 3400-3410MHz
- EME Centre of Activity has migrated from 3456 to 3400.1MHz to promote harmonised usage and activity
- Amateur Satellite Service is allocated in 3400-3410MHz in Regions 2&3 and in some countries of Region-1.
- 3400.750-3400.800MHz may be designated for Local Beacon use (10W ERP max) by National Societies.
- Refer to Beacons Chapter for coordination of beacons in the beacon sub-band

4.9 5650 - 5850 MHz BANDPLAN

Frequency	Maximum Bandwidth	Mode	Usage
5650.000 5668.000	2700 Hz	ALL MODES	AMATEUR SATELLITE SERVICE (up-link)
5668.000 5670.000	2700 Hz	ALL MODES	5668.200 Narrow band center of activity (a) AMATEUR SATELLITE SERVICE (up-link)
5670.000 5700.000		MGM	
5700.000 5720.000		ATV	
5720.000 5760.000		ALL MODES	
5760.000 5760.800	2700 Hz	ALL MODES	5760.200 Narrow band center of activity (a) 5760.750-5760.800 Local Beacon (d)
5760.800 5760.990		Telegraphy MGM	BEACONS ONLY
5761.000 5762.000	2700 Hz	ALL MODE	
5762.000 5830.000		ALL MODES	(d)
5830.000 5850.000		ALL MODES	AMATEUR SATELLITE SERVICE (down-link)

4.9.1 Notes: BANDPLAN

Footnotes

- a. Societies are urged to inform their members that stations should preferably be able to operate in both narrow-band segments.
- b. 5760.750-5760.800MHz may be designated for Local Beacon use (10W ERP max) by National Societies.
- c. Refer to Beacons Chapter for coordination of beacons in the beacon sub-band Section 11.
- d. Any wideband system shall protect narrowband applications, which have priority

4.10 10.000 - 10.500 GHz BANDPLAN

Frequency GHz	Maximum Bandwidth	Mode	Usage
10.000			
10.150		MGM	
10.150			
10.250		ALL MODES	
10.250			
10.350		MGM	
10.350			
10.368		ALL MODES	
10.368	2700 Hz	ALL MODES	10.3682 Narrow band center of activity 10368.750-10368.800 Local Beacon (d)
10.368.800			
10.368.800			BEACONS ONLY (c)
10.368.990			
10.369	2700 Hz	ALL MODES	
10.370			
10.370		ALL MODES	
10.450			
10.450		ALL MODES	10.450-10.452 Narrow band modes in countries where 10.368-10.370 is not available AMATEUR SATELLITE SERVICE
10.500			

4.10.1 Notes: BANDPLAN

Footnotes

- In those countries where the narrow-band segment 10368 - 10370 MHz is not available, the segment 10450 - 10452 MHz is suggested as an alternative narrow-bandwidth segment.
- 10368.750-10368.800 may be designated for Local Beacon use (10W ERP max) by National Societies.
- Refer to Beacons Chapter for coordination of beacons in the beacon sub-band Section 11

4.11 24.000 - 24.250 GHz BANDPLAN (San Marino 2002)

Frequency GHz	Maximum Bandwidth	Mode	Usage
24.000		ALL MODES	24.025 Wideband centre of activity (Varna 2014)
24.048			
24.048	2700 Hz	ALL MODES	24.0482 Narrow band centre of activity AMATEUR SATELLITE SERVICE NARROW BAND MODES 24048.750-24048.800MHz Local Beacon (b)
24.048.800			
24.048.800		ALL MODES	BEACONS (c)
24.048.995			
24.049	2700 Hz	ALL MODES	AMATEUR SATELLITE SERVICE & NARROW BAND MODES
24.050			
24.050		ALL MODES	
24.250			

4.11.1 Notes: BANDPLAN

Footnotes

- a. Deleted (Varna 2014)
- b. 24048.750-24049.800MHz may be designated for Local Beacon use (10W ERP max) by National Societies.
- c. Refer to Beacons Chapter for coordination of beacons in the beacon sub-band

4.12 47.000 - 47.200 GHz BANDPLAN (Vienna 2004)

Frequency	Maximum Bandwidth	Mode	Usage
47.000		ALL MODES	
47.088			
47.088	2700 Hz	ALL MODES	47.088200 Narrow band center of activity AMATEUR SATELLITE SERVICE
47.090			
47.090		ALL MODES	
47.200			

4.13 75.50-81.50 GHz BANDPLAN (Davos 2005)

Frequency	Maximum Bandwidth	Mode	Usage
75.500	2700 Hz	All Mode	AMATEUR SATELLITE SERVICE (Preferred) (a)
76.000			75976.200 MHz : Preferred Narrow band centre of activity
76.000		All Mode	76032.200 MHz :Narrow Band Centre of activity in some countries (not preferred) (b)
77.500			
77.500	2700 Hz	All Mode	77500.200 MHz: Preferred NB centre of activity in countries outside the CEPT area (non-preferred / preferred) (c)
77.501			AMATEUR SATELLITE SERVICE
77.501		All Mode	ALL MODES (Preferred segment)
78.000			
78.000		All Mode	ALL MODES (not preferred)
81.500			

4.13.1 Notes: BANDPLAN

Footnotes

- a. Preferred in those CEPT countries having implemented EU35.
- b. Between 77.5 and 78 GHz the amateur and amateur satellite service have a primary/exclusive status and between 75,5-76 GHz a primary status through ECA footnote EU35 in CEPT countries, while the status is secondary in the remainder of the allocation. The all mode section in the secondary segment should only be used in case the preferred segment cannot be used
- c. Preferred in those countries not having implemented EU35

4.14 122.25 - 123 GHz BANDPLAN (San Marino 2002)

Frequency	Maximum Bandwidth	Mode	Usage
122.250	2700 Hz	All Mode	NARROW BAND MODES
122.251			
122.251		All Mode	
123.000			

4.15 134 - 141 GHz BANDPLAN

Frequency	Maximum Bandwidth	Mode	Usage
134.000		ALL MODES	AMATEUR SATELLITE SERVICE
134.928 134.928	2700Hz	ALL MODES	134.930 GHz Narrow band center of activity
134.930 134.930		ALL MODES	
136.000 136.000		ALL MODES	(not preferred) (a)
141.000			

4.15.1 Notes: BANDPLAN

Footnotes

- a) Between 134 and 136 GHz the amateur and amateur satellite service have a primary/exclusive status, while the status is secondary in the remainder of the allocation.

The all mode section in the secondary segment should only be used in case the preferred segment cannot be used

4.16 241 - 250 GHz BANDPLAN (San Marino 2002)

Frequency	Maximum Bandwidth	Mode	Usage
241.000		ALL MODES	(not preferred) (a)
248.000		ALL MODES	AMATEUR SATELLITE SERVICE & NARROW BAND MODES
248.001		ALL MODES	(Preferred segment) (b)
250.000			

4.16.1 Notes: BANDPLAN

Footnotes

- a. The all mode section in the secondary segment should only be used in case the preferred segment cannot be used
- b. Between 248 and 250 GHz the amateur and amateur satellite service have a primary/exclusive status, while the status is secondary in the remainder of the allocation