

# WWARA BAND PLANS

## Spectrum Use Considerations

Definitions: NBFM 16 kHz nominal bandwidth  
VNBD 12.5 kHz nominal bandwidth  
UNBD 6.25 kHz nominal bandwidth

### 10-Meter Band

29.5200 - 29.5800 Repeater Inputs 20 kHz Spacing<sup>1 2 4</sup>  
29.6000 Simplex  
29.6200 - 29.6800 Repeater Outputs 20 kHz Spacing<sup>1 3 4</sup>

#### Notes:

- <sup>1</sup> 20kHz channel spacing
- <sup>2</sup> Paired with repeater outputs + 0.1MHz
- <sup>3</sup> Paired with repeater inputs - 0.1MHz
- <sup>4</sup> WWARA coordination recommended

### 6-Meter Band

50.0000 50.1000 CW Only  
50.0600 50.0800 Beacon Sub-band  
50.1000 50.3000 SSB, CW  
50.1000 50.1250 DX Window  
50.1250 SSB Calling  
50.3000 50.6000 All Modes  
50.6000 50.8000 Digital Non-Voice Communications<sup>1</sup>  
50.6200 Packet Calling Frequency  
50.8000 51.8000 Radio Control<sup>1</sup>  
51.0000 51.1000 SSB Pacific DX Window  
51.1000 52.2900 FM Repeater inputs<sup>1 2 3 4</sup>  
52.3100 52.5500 FM Non-Data, Voice Only, Simplex<sup>1 5</sup>  
52.5250 National Simplex Frequency<sup>5</sup>  
52.5700 FM Cross-band Linking Frequency  
52.5900 52.7900 Data, Non-Voice, Simplex<sup>1</sup>  
52.8100 53.9900 FM Repeater Outputs<sup>1 3 4 6</sup>

#### Notes:

- <sup>1</sup> 20kHz channel spacing
- <sup>2</sup> Paired with repeater inputs +1.7MHz
- <sup>3</sup> WWARA coordination recommended
- <sup>4</sup> 52.19/52.99 Shared Non-Protected (SNP) repeater pair
- <sup>5</sup> 52.51, 52.53 not used to protect national simplex frequency
- <sup>6</sup> Paired with repeater inputs -1.7MHz

### 2-Meter Band

144.0000 - 144.0500 EME (CW)

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144.0500 -	144.1000	General CW and weak signals
144.1000 -	144.2000	EME and weak signal SSB
144.2000 -	144.2750	General SSB operation
144.2750 -	144.3000	Propagation Beacons
144.3000 -	144.5000	New OSCAR subband
144.5000 -	144.6000	FM Repeater/Linear Translator inputs <sup>1 2 3 4</sup>
144.6000 -	144.9000	FM Repeater inputs <sup>1 2 3 4</sup>
144.9000 -	145.1000	Digital (Packet) Communications
145.1000 -	145.2000	FM Repeater/Linear Translator outputs <sup>1 2 3 4</sup>
145.2000 -	145.4900	FM Repeater outputs <sup>1</sup>
145.5000 -	145.8000	Miscellaneous and experimental modes
145.8000 -	146.0000	OSCAR Sub band
146.0050		Special UNBD Repeater Output #1 <sup>1 6</sup>
146.0100 -	146.4000	Repeater inputs <sup>1 2 3</sup>
146.40625 -	146.50625	VNBD Repeater Outputs <sup>1 5</sup>
146.5200 -	146.5800	Simplex
146.5200		National Simplex Frequency
146.6000		FM cross-band linking frequency
146.6050		Special UNBD Repeater Input #1 <sup>1 6</sup>
146.6200 -	147.3800	Repeater outputs <sup>1 2 3</sup>
147.3950		Special UNBD Repeater Input #2 <sup>1 6</sup>
147.40625 -	147.50625	VNBD Repeater Inputs <sup>1 5</sup>
147.5200 -	147.6000	Simplex
147.6100 -	147.9900	Repeater inputs <sup>1 2 3</sup>
147.9950		Special UNBD Repeater Output #2 <sup>1 6</sup>

Notes:

<sup>1</sup> WWARA coordination recommended

<sup>2</sup> Washington, the adjoining States and BC use 20 kHz spacing between repeater channels

<sup>3</sup> Repeater channels are on odd frequencies below 146 MHz and even frequencies above 146 MHz

<sup>4</sup> 144.53/145.13 and 144.69/145.29 Shared Non-Protected (SNP) repeater pair

<sup>5</sup> 146.4125, bottom center frequency; 12.5 kHz steps, 8 channels to 146.5000, + 1 MHz offset; VNBD, UNBD only

<sup>6</sup> Two Special UNBD channels, 6.25 kHz bandwidth only

**1.25m MHz Band Plan**

222.0000 -	222.0250	EME
222.0250 -	222.0990	CW
222.1000		National SSB Calling Frequency
222.1010 -	222.1540	SSB
222.1550 -	222.1700	Beacons
222.1710 -	222.1750	Guard Band
222.1800 -	222.3800	Repeater Inputs <sup>1 2</sup>
222.4000		Shared Non-Protected (SNP) # 1 Input <sup>1</sup>
222.4200 -	223.0200	Repeater Inputs: <sup>1 2</sup>

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223.0350 -	223.0650	ACSSB Inputs <sup>1</sup>
223.0800 -	223.2200	Repeater Inputs <sup>1 2</sup>
223.2400		Shared Non-Protected (SNP) # 2 Input <sup>1</sup>
223.2600 -	223.3800	Repeater Inputs <sup>1 2</sup>
223.4000 -	223.4800	FM Simplex/FM Packet <sup>2</sup>
223.5000		National FM Calling Frequency
223.5200 -	223.5400	Point-to-Point Control <sup>1</sup>
223.5600 -	223.6600	100 kHz Hi Speed Data Channel # 1
223.6600 -	223.7600	100 kHz Hi Speed Data Channel # 2
223.7800 -	223.9800	Repeater Outputs <sup>1 2</sup>
224.0000		Shared Non-Protected (SNP) # 1 Output <sup>1</sup>
224.0900		Cross Band Repeater Freq.
224.0200 -	224.6200	Repeater Outputs <sup>1 2</sup>
224.6350 -	224.6650	ACSSB Repeater Outputs <sup>1</sup>
224.6800 -	224.8200	Repeater Outputs <sup>1 2</sup>
224.8400		Shared Non-Protected (SNP) # 2 Output <sup>1</sup>
224.8600 -	224.9800	Repeater Outputs <sup>1 2</sup>
224.9950 -	225.0000	Guard Band

Notes:

<sup>1</sup> WWARA Coordination recommended

<sup>2</sup> All FM Repeaters and simplex operations are on 20 kHz spacing

**70cm Band Plan**

420.0000 -	426.0000	ATV repeater, control links and experimental operation <sup>1 2 4</sup>
421.2500		Video carrier for ATV <sup>3</sup>
426.0000 -	432.0000	ATV simplex, control links special mode and experimental operation <sup>1 2</sup>
427.2500		Video carrier for ATV <sup>3</sup>
430.8000 -	431.0000	Packet radio
432.0000 -	433.0000	Weak signal activities - NO FM ALLOWED
432.1000		National SSB calling
433.0000 -	435.0000	ATV repeater, auxiliary links and repeater links <sup>1</sup>
434.0000		Video carrier for ATV <sup>3</sup>
435.0000 -	438.0000	Satellite only by international treaty
438.0000 -	440.0000	Control links, special modes and experimental operation <sup>1 4 8</sup>
439.8000 -	439.9750	Packet Radio <sup>8</sup>
440.0000 -	445.0000	Repeater outputs, links and simplex <sup>1 5 8</sup>
440.0000		Shared Non-Protected Pair (SNP) #1 output
440.0250		Cross band operation <sup>6</sup>
440.7000 -	440.7750	Packet repeater outputs <sup>8</sup>
440.8000 -	440.9000	Packet simplex <sup>8</sup>
441.0000		National Packet simplex frequency
443.0000		Shared Non-Protected Pair (SNP) #2 output
445.0000 -	450.0000	Repeater inputs, links and simplex <sup>1 8</sup>
445.0000		Shared Non-Protected Pair (SNP) #1 input
445.7000 -	445.7750	Packet repeater inputs <sup>8</sup>
445.8000 -	445.9000	Voice simplex only <sup>7 8</sup>

445.8250 Shared Public Service simplex. Other frequencies will be added for this use as they become available  
445.9750 - 446.0250 Voice simplex only<sup>7 8</sup>  
446.0000 National FM simplex calling  
448.0000 Shared Non-Protected Pair (SNP) #2 input

Notes:

- <sup>1</sup> WWARA Coordination recommended
- <sup>2</sup> 420 MHz to 430 MHz cannot be used north of line A
- <sup>3</sup> WWARA will assist with technical ATV requirements only and because there is only one channel per segment, the WWARA will not coordinate their exclusive use
- <sup>4</sup> Some control links are coordinated in this band
- <sup>5</sup> Segments designated simplex do not require coordination
- <sup>6</sup> This frequency can be used without coordination recommendation for temporary cross band operation from designated frequencies in other bands. High power, big antenna arrays and permanent operations are NOT RECOMMENDED. This frequency is afforded no protection.
- <sup>7</sup> There is some existing activity coordinated within these segments. Efforts are being made to clear the whole 445.800 through 446.000 MHz segment for exclusive voice simplex operation.
- <sup>8</sup> NBFM channel spacing is 25 kHz, VNBD spacing is 12.5 kHz.

**33cm MHz Band Plan**

902.0000 - 902.3000 Weak signal activities - NO FM ALLOWED  
902.3000 - 903.0000 Repeater inputs<sup>1 2</sup>  
903.0000 - 904.0000 Experimental Channel 1<sup>3</sup>  
903.1000 Weak Signal Calling  
904.0000 - 912.0000 Channel 1<sup>3</sup>  
912.0000 - 918.0000 ATV1  
918.0000 - 926.0000 Channel 2<sup>3</sup>  
926.0000 - 927.0000 Experimental Channel 2<sup>3</sup>  
927.0000 - 927.3000 Digital  
927.3000 - 928.0000 Repeater Outputs<sup>1 2</sup>  
927.5000 National FM simplex calling

Notes:

- <sup>1</sup> WWARA Coordination recommended
- <sup>2</sup> All FM and data channels at 25 kHz spacing
- <sup>3</sup> Automatic Vehicle Monitoring (AVM) is the primary user in this segment

**23cm MHz Band Plan**

1240.000 - 1246.000 ATV #1<sup>3</sup>  
1246.000 - 1247.000 NB FM Links<sup>1 2</sup>  
1247.000 - 1252.000 D-STAR DD mode repeaters<sup>8</sup>  
1252.000 - 1258.000 ATV #2<sup>3</sup>

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1258.000 -	1270.000	Satellite Uplinks, Experimental, Simplex ATV <sup>4</sup>
1270.000 -	1271.000	D-STAR DV mode repeater inputs <sup>5</sup>
1270.000 -	1275.000	Repeater Inputs <sup>1 2</sup>
1275.000 -	1276.000	Narrowband Simplex <sup>1 6</sup>
1276.000 -	1282.000	ATV #3 <sup>3</sup>
1282.000 -	1290.000	Wide & Narrow Band FM Links <sup>1</sup>
1290.000 -	1291.000	D-STAR DV mode repeater outputs <sup>5</sup>
1290.000 -	1295.000	Repeater Outputs <sup>1 2</sup>
1292.500		FM cross-band linking frequency
1294.500		National FM simplex call channel
1295.000 -	1297.000	NB, Weak signal - NO FM
1296.100		National SSB call channel
1297.000 -	1300.000	Digital Communications <sup>7 8</sup>

Notes:

<sup>1</sup> All FM simplex and repeater channels are on 25kHz spacing

<sup>2</sup> WWARA coordination recommended

<sup>3</sup> ATV repeater operation, WWARA coordination recommended

<sup>4</sup> Care should be exercised when using this segment to prevent interference to satellite communications

<sup>5</sup> Includes other narrowband modes with 25kHz spacing

<sup>6</sup> Recommended for D-STAR DV simplex operations

<sup>7</sup> Divided into ten 300kHz channels available for D-STAR DD mode simplex and repeater operations

<sup>8</sup> D-STAR DD systems will not be “coordinated” or offered any protection. WWARA will record their existence and make that information available.

## WWARA DIGITAL COORDINATION

The following is the WWARA policy regarding Packet Radio Systems (see the current coordination policies for latest rules):

- a. The WWARA shall not issue Certificate of Coordination to any digital systems, except when the proposed system requires;
  1. Use of a standard repeater pair or link frequencies.
  2. Use of spectrum previously and or historically coordinated for non-packet relay systems lying outside of established and recognized Packet Radio spectrum.
- b. The WWARA shall protect existing coordinated co-site and adjacent frequency repeater from the effects of system performance degradation caused by Packet Radio Systems. Conventional FCC interference criteria will be used to determine degradation.
- c. The WWARA shall work with the ARRL, regional coordination organizations, as well as local and regional Packet Radio organization in the development of band plans that will set out specific band for Packet Radio communications.

## SHARED NON PROTECTED REPEATERS

The WWARA has established several Shared Non Protected (SNP) repeater pairs. SNP systems should be registered by frequency and CTCSS tone and be kept current. Registration or Notification of intended use of a SNP frequency may be by either filling out a WWARA Technical data sheet and mailing to the WWARA official mail address or by using the WWARA on-line registration process at [www.wwara.org](http://www.wwara.org).

Questions not answered in this section should be referred to the appropriate WWARA representative or Board member. See the current coordination policies for the latest rules.

Other guidelines for the use of these frequencies are:

- a. All users of these frequencies shall share the use of it.
- b. Users receive no interference protection from other co-channel users.
- c. All systems shall use CTCSS access or other approved methods of limited access. No COR operation of any kind is permitted. The WWARA Band Chairmen shall track utilization of SNP frequencies within their respective bands and make this information available to all those requesting the same.
- d. Operation of SNP systems shall be on a non-interference basis with other coordinated systems as defined in CFR 47, Part 97.
- e. Use of SNP frequencies shall be restricted to voice/non-data and shall not be linked to other repeaters.
- f. The use of radios capable of cross band operation to facilitate a temporary repeater should not be used for a permanent installation but may be used for specific events not to exceed the duration of the event (typically two days). Physical separation of the radios should not exceed 1 mile. Transmitter power shall be the lowest power possible to facilitate communications as per CFR 47, Part 97. The WWARA recommends pre-registering prior to operation. Cross Band Operation section may also apply.
- g. The SNP pairs using standard frequency pairing are:

6 meters	51.19 - 52.99
2 meters	144.53-145.13 and 144.69 - 145.29
222 MHz	223.12 - 224.72 and 223.24 - 224.84
440 MHz	445.00 - 440.00 and 448.00 - 443.00
- h. Power recommendations (elevations in AMSL, Power is ERP in Watts)
  - 0-500' - 20 Watts
  - 501 - 1000' - 10 Watts
  - 1001' and greater may be recommended on a case by case basis by the WWARA or operated during a declared emergency.

#### CROSS BAND REPEATER / DUPLEX RADIO RECOMMENDATIONS

See the current coordination policies for the latest rules.

Cross band repeater or duplex radios should:

- a. Never be used to link to an established repeater system or to link two established repeaters together without the express approval of the repeater owners.
- b. Be used for temporary, short duration activities only and never installed as a long-term communication facility.
- c. Utilize the minimum power necessary as per CFR47, Part 97 to accomplish the desired communications. A transmitter placed in the vicinity of the operator should use a non-radiation load or be configured for minimum power output on a unity gain antenna.
- d. Utilize CTCSS decode and encode circuitry to minimize uninvited access and unnecessary frequency congestion. Care should be exercised to use a unique CTCSS tone.
- e. Be identified every 10 minutes in accordance with CFR47, Part 97.

- f. Be disabled by its operator within 15 minutes of notification of interference or other problems as defined in CFR47, Part 97.
- g. Should be continually monitored by the operator to minimize interference.

Recommended cross band frequencies are:

10 Meters	29.6
6 Meters	52.57
2 Meters	146.6
1.25m	224
70cm	440.025
23cm	1292.5

#### §97.303 FCC Frequency sharing requirements

The following is a summary of the frequency sharing requirements that apply to amateur station transmissions on the frequency bands specified in §97.301 of this Part. (For each ITU Region, each frequency band allocated to the amateur service is designated as either a secondary service or a primary service. A station in a secondary service must not cause harmful interference to, and must accept interference from, stations in a primary service. See §§2.105 and 2.106 of the FCC Rules, United States Table of Frequency Allocations for complete requirements.)

(a) Where, in adjacent ITU Regions or sub-Regions, a band of frequencies is allocated to different services of the same category (i.e., primary or secondary allocations), the basic principle is the equality of right to operate. Accordingly, stations of each service in one Region or sub-Region must operate so as not to cause harmful interference to any service of the same or higher category in the other Regions or sub-Regions. (See ITU Radio Regulations, edition of 2004, No. 4.8.)

(b) No amateur station transmitting in the 1900-2000 kHz segment, the 70 cm band, the 33 cm band, the 23 cm band, the 13 cm band, the 9 cm band, the 5 cm band, the 3 cm band, the 24.05-24.25 GHz segment, the 76-77.5 GHz segment, the 78-81 GHz segment, the 136-141 GHz segment, and the 241-248 GHz segment shall not cause harmful interference to, nor is protected from interference due to the operation of, the Federal radiolocation service.

(c) No amateur station transmitting in the 1900-2000 kHz segment, the 3 cm band, the 76-77.5 GHz segment, the 78-81 GHz segment, the 136- 141 GHz segment, and the 241-248 GHz segment shall cause harmful interference to, nor is protected from interference due to the operation of, stations in the non-Federal radiolocation service.

(d) No amateur station transmitting in the 30 meter band shall cause harmful interference to stations authorized by other nations in the fixed service. The licensee of the amateur station must make all necessary adjustments, including termination of transmissions, if harmful interference is caused.

(e) In the 1.25 m band:

(1) Use of the 219-220 MHz segment is limited to amateur stations participating, as forwarding stations, in point-to-point fixed digital message forwarding systems, including intercity packet backbone networks. It is not available for other purposes.

(2) No amateur station transmitting in the 219-220 MHz segment shall cause harmful interference to, nor is protected from interference due to operation of Automated Maritime Telecommunications Systems (AMTS), television broadcasting on channels 11 and 13, 218-219 MHz Service systems, Land Mobile Services systems, or any other service having a primary allocation in or adjacent to the band.

(3) No amateur station may transmit in the 219-220 MHz segment unless the licensee has given written notification of the station's specific geographic location for such transmissions in order to be incorporated into a data base that has been made available to the public. The notification must be given at least 30 days prior to making such transmissions. The notification must be given to:

The American Radio Relay League  
225 Main Street  
Newington, CT 06111-1494

(4) No amateur station may transmit in the 219-220 MHz segment from a location that is within 640 km of an AMTS Coast Station that uses frequencies in the 217-218/219-220 MHz AMTS bands unless the amateur station licensee has given written notification of the station's specific geographic location for such transmissions to the AMTS licensee. The notification must be given at least 30 days prior to making such transmissions. The location of AMTS Coast Stations using the 217-218/219-220 MHz channels may be obtained from either:

The American Radio Relay League  
225 Main Street  
Newington, CT 06111-1494

or

Interactive Systems, Inc.  
Suite 1103  
1601 North Kent Street  
Arlington, VA 22209  
Fax: (703) 812-8275  
Phone: (703) 812-8270

(5) No amateur station may transmit in the 219-220 MHz segment from a location that is within 80 km of an AMTS Coast Station that uses frequencies in the 217-218/219-220 MHz AMTS bands unless that amateur station licensee holds written approval from that AMTS licensee. The location of AMTS Coast Stations using the 217-218/219-220 MHz channels may be obtained as noted in paragraph (e)(4) of this section.

(f) In the 70 cm band:

- (1) No amateur station shall transmit from north of Line A in the 420-430 MHz segment.
- (2) The 420-430 MHz segment is allocated to the amateur service in the United States on a secondary basis, and is allocated in the fixed and mobile (except aeronautical mobile) services in the International Table of allocations on a primary basis. No amateur station transmitting in this band shall cause harmful interference to, nor is protected from interference due to the operation of, stations authorized by other nations in the fixed and mobile (except aeronautical mobile) services.
- (3) The 430-440 MHz segment is allocated to the amateur service on a secondary basis in ITU Regions 2 and 3. No amateur station transmitting in this band in ITU Regions 2 and 3 shall cause harmful interference to, nor is protected from interference due to the operation of, stations authorized by other nations in the radiolocation service. In ITU Region 1, the 430-440 MHz segment is allocated to the amateur service on a co-primary basis with the radiolocation service. As between these two services in this band in ITU Region 1, the basic principle that applies is the equality of right to operate. Amateur stations authorized by the United States and radiolocation stations authorized by other nations in ITU Region 1 shall operate so as not to cause harmful interference to each other.



(4) No amateur station transmitting in the 449.75-450.00 MHz segment shall cause interference to, nor is protected from interference due to the operation of stations in, the space operation and space research services.

(g) In the 33 cm band:

(1) In the States of Colorado and Wyoming, bounded by the area of latitude 39° N. to 42° N. and longitude 103° W. to 108° W., an amateur station may transmit in the 902 MHz to 928 MHz band only on the frequency segments 902.0-902.4, 902.6-904.3, 904.7- 925.3, 925.7-927.3, and 927.7-928.0 MHz. This band is allocated on a secondary basis to the amateur service subject to not causing harmful interference to, and not receiving any interference protection from, the operation of industrial, scientific and medical devices, automatic vehicle monitoring systems, or Government stations authorized in this band.

(2) No amateur station shall transmit from those portions of the States of Texas and New Mexico bounded on the south by latitude 31° 41' N, on the north by latitude 34° 30' N, on the east by longitude 104° 11' W, and on the west by longitude 107° 30' W.

(h) No amateur station transmitting in the 23 cm band, the 3.3-3.4 GHz segment, the 3 cm band, the 24.05-24.25 GHz segment, the 76-77.5 GHz segment, the 78-81 GHz segment, the 136-141 GHz segment, and the 241-248 GHz segment shall cause harmful interference to, nor is protected from interference due to the operation of, stations authorized by other nations in the radiolocation service.

(i) In the 23 cm band, no amateur station shall cause harmful interference to, nor is protected from interference due to the operation of, stations in the radionavigation-satellite service, the aeronautical radionavigation service, the Earth exploration-satellite service (active), or the space research service