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AREA REPEATER COORDINATION COUNCIL of EPA/SNJ

ARCC 33CM BANDPLAN MODIFICATION PROPOSAL

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INTRODUCTION

In recent years there has been increased interest in the 33cm band. This is likely due to a combination of factors including the ever-increasing congestion on the lower frequency bands, particularly 2m and 70cm, as well as increased availability of surplus commercial radio equipment suitable for operation in the 33cm band.

The 33cm band has historically been under-utilized in ARCC territory. At present, there is only one FM repeater and two ATV repeaters coordinated in this band, along with a small number of point-to-point voice and data auxiliary links. Of the 26 MHz of spectrum available on this band, the vast majority is unused from both a spectral as well as geographic perspective. In contrast, the 70cm band is heavily used, although not yet to the degree of crowding as is the case on 2m. Even the next higher-frequency band, 23cm, has more coordinated activity than does 33cm.

As a frequency coordinator, ARCC has noted an increase in applications for a number of new FM repeaters. Most of these new applications have requested, or specified, a frequency pair with an input offset of -25 MHz, which the current bandplan does not support. Other coordination councils have modified their 33cm bandplans in recent years to support 25 MHz split repeater pairs, and likewise, ARCC has received requests from applicants to modify its bandplan so that these pending applications could be processed. Although the perceived need to create a 25 MHz split repeater subband has been a significant reason for proposing revisions to the current bandplan, it is not the only motivating factor.

In light of the above, in order to promote efficient and orderly use of the spectrum available, and to continue to foster increased utilization of the 33cm band, ARCC proposes to modify the current 33cm band substantially. In doing so, many improvements over the old bandplan will be realized. The instant proposal represents the culmination of over two years of analyses and discussion, including reviewing and weighing the relative merits of other coordinators' 33cm bandplans, including those which have been revised in recent years.

ARCC has spent considerable effort to develop a bandplan which will promote use of the band via the addition of new FM repeater segments while maintaining protection of incumbent operations. The proposed changes will also improve the protection of weak-signal operations and other non-coordinated activities. In general, ARCC believes that the proposed changes make the most efficient use of the 33cm band today and into the foreseeable future. Discussion of the modifications proposed, and the resulting effects of the same, are detailed in the following sections.

25 MHz Offset Voice Repeater Pairs

While ARCC's current bandplan already has subbands reserved for FM repeaters utilizing -12 MHz offsets, the general consensus among the amateur repeater community is that a -25 MHz repeater offset is more desirable than the existing -12 MHz bandplan. Proponents of 25 MHz split pairs argue that surplus commercial radio equipment for the 900 MHz band is much easier to convert to operate in the 33cm amateur band using a 25 MHz offset, with repeater transmitters at the upper end of the band (927-928 MHz) and repeater receivers at the low end of the band (902-903 MHz). Most commercial 900 MHz two-way equipment was designed for 935-941 MHz operation with a -39 MHz input offset (896-902 MHz). Extensive modifications are required to move this surplus equipment greatly outside of its design range into the existing -12 MHz split subbands (906-909 input, 918-921output), thereby creating a significant deterrent for most amateurs, particularly would-be repeater users, who otherwise would be interested in operating on this band. ARCC is presently holding a number of applications for coordination of new FM repeaters on 25 MHz split pairs.

As noted previously, 25 MHz repeater pairs require the use of the 1 MHz of spectrum at both extremities of the 26 MHz available on the band, i.e. 902-903 MHz paired with 927-928 MHz. Portions of this spectrum are encumbered by both coordinated and non-coordinated operations per the current bandplan, and, as such, provisions have been made in the instant proposal to minimize adverse effects to these existing operations.

In the current ARCC 33cm bandplan, 902-903 MHz is reserved for weak signal operations. In ARCC's service area, most weak signal operators utilize the lower range of 903 MHz (not 902 MHz), centered around the 903.1 MHz calling frequency. In other areas of the country, weak signal operators use the bottom of 902 MHz, with 902.1 MHz as the calling frequency. ARCC's existing 33cm bandplan was fashioned after the ARRL's bandplan at the time of its development. The ARRL 33cm bandplan, both then and now, does not accurately reflect the utilization of the 33cm band in most areas of the country, and as such, many, if not most, coordinators have chosen to abandon it.

In light of the fact that weak signal operators in other parts of the country utilize the lower end of the 902 MHz region for weak signal communications, it is ARCC's intent to continue to reserve a segment of the 902 MHz range for weak signal communications. Retaining a portion of the 902 MHz weak signal subband is recommended over abandoning it in favor of utilizing the entire 902-903 range for repeaters for two reasons. First and foremost is lesser interference from unlicensed Part 15 ISM band devices at 902.1 MHz, as those unlicensed devices have significantly reduced emissions at the edges of the 33cm band. Weak signal operators may choose to gravitate more toward 902.1 instead of 903.1 as the proliferation of Part 15 devices continues to raise the noise floor higher at 903 as compared to 902. Second, as 902.1 is commonly used in other areas of the country, weak signal operators in ARCC's territory will be able to continue to pursue DX contacts in the low 902 range without interference from new repeater operations, even if they continue to utilize 903.1 for more localized or regional contacts, contests, and nets.

Therefore, it is proposed that the lower 300 kHz of the 902-903 range be reserved for weak signal operations, and the upper 700 kHz be utilized for repeater inputs, with one channel (902.5000) reserved as an FM simplex channel. Repeater inputs will be spaced at 12.5 kHz channel intervals. Only narrowband repeaters (11.2 kHz or less occupied bandwidth) will be permitted to use these pairs as input frequencies. Both conventional narrowband FM as well as digital voice (DV) repeaters (Project 25, D-Star, etc.) will be permitted. The repeater pair 927.9875- will be reserved as a shared/non-protected (SNP) repeater pair. This channel may be used without prior coordination. Portable/emergency repeaters and "back yard" repeater experimenters are encouraged to use this pair. All FM/DV repeaters shall utilize vertical polarization only.

It is proposed that the 902-903 MHz region be reallocated as follows:

902.0000 - 902.3000	Weak signal modes (CW, SSB, EME, beacons)
902.3125 - 902.4875	Narrowband FM/DV repeater inputs (12.5 kHz spacing)
902.5000	FM simplex
902.5125 - 902.9750	Narrowband FM/DV repeater inputs (12.5 kHz spacing)
902.9875	Narrowband SNP/portable repeater input

The corresponding FM/DV repeater outputs that fall 25 MHz above the repeater inputs (i.e. 927.3 to 928 MHz range) overlap the upper 1 MHz of the amateur television (ATV) repeater channel that spans 922 to 928 MHz in the current bandplan. At present, there are two ATV repeaters coordinated in ARCC territory which use the 922-928 MHz subband as a repeater output (W3PHL Philadelphia, PA and K3IR Manheim, PA).

The lower 300 kHz of the 927-928 range (i.e. 927.0-927.3) is already excluded from being available for FM/DV repeater outputs as the input range (902.0-902.3) will be exclusive to weak signal operations. Therefore, only the upper 700 kHz of spectrum of the 6 MHz ATV channel is a possible candidate for use by FM/DV repeaters. It is proposed that the remaining lower 300 kHz of the 927-928 segment (927.0-927.3) will be available point to point FM auxiliary links on a non-interference basis to the two existing coordinated ATV operations.

By virtue of operating at the upper end of the 6 MHz ATV channel (i.e. above 927.3 MHz), as compared to operating lower in the channel closer to the visual carrier frequency at 923.250 MHz, interference to ATV repeater users receiving the 922-928 repeater output is minimized. ARCC will encourage new applicants for FM/DV repeaters to select output frequencies at the upper end of new repeater subband if the proposed repeater is located within the coverage area of either of the two incumbent ATV repeaters in order to further minimize the impact to users of the two grandfathered ATV repeaters that receive the 922-928 MHz repeater output transmissions. Specifically, new FM/DV repeaters will be coordinated only above the 927.500 MHz FM simplex calling frequency until no available pairs remain in areas served by either of the two incumbent ATV repeaters. This puts the narrowband FM/DV carriers above the chroma range of the NTSC ATV video. In addition, FM/DV repeater pairs between 927.7000 and 927.7750 inclusive will not be coordinated within the coverage area of either of the two coordinated ATV repeaters if the incumbent ATV repeater transmits an FM aural carrier at 927.750 MHz.

In order to continue to promote the use of 33cm for ATV, and to also provide additional interference protection for the same, it is proposed that the upper ATV channel be modified by lowering the entire channel by 1 MHz, thereby eliminating the overlap with narrowband FM/DV repeaters in the upper end of this range. The two existing ATV repeaters coordinated to use 922-928 will not be in jeopardy of losing coordination as the existing coordinations will be grandfathered, and those two repeaters will be protected from new interference from narrowband voice/DV repeater outputs via the measures outlined above. New ATV repeaters will only be coordinated in the revised 921-927 MHz ATV output channel. 921-927 MHz is the spectrum recommended in the ARRL bandplan for an ATV channel, and likewise is used at an ATV channel by ARCC's neighbor, the Western PA Repeater Council. Other adjacent councils' bandplans (TMARC, UNYREPCO, Metrocor) do not provide for a second ATV channel on 33cm in this spectrum, only a single ATV channel in the middle of the band similar to ARCC's current and proposed 33cm bandplan. As such, ARCC contends that its proposed bandplan is superior to other alternatives investigated in that it affords two channels for ATV on 33cm.

Lowering the ATV channel by 1 MHz to 921-917 MHz necessitates the deletion of the existing 921-922 MHz FM simplex subband. ARCC is unaware of any regularly-occurring FM simplex activity in this

subband. Even if such simplex FM activity did exist, it is unlikely that the itinerant and intermittent nature of such operations will cause appreciable adverse impact to ATV operations in this spectrum.

It is proposed that the 921-928 MHz region be reallocated as follows:

921.0000 - 927.0000	ATV repeater output
927.0125 - 927.3000	FM auxiliary links (12.5 kHz spacing)
927.3125 - 902.9750	Narrowband FM/DV repeater outputs (12.5 kHz spacing), subject to the ATV protection measures detailed above
927.9875	Narrowband SNP/portable repeater output
922.0000 - 928.0000	ATV Repeater Output (two grandfathered coordinations only)

903 MHz Weak Signal and 903-905 Digital Subbands

The present bandplan has no subband reserved for weak signal operations in the lower 903 MHz region, even though it is the de facto 33cm weak signal subband in the northeastern US as discussed previously. In order to protect weak signal operations in this region, a new 903 MHz weak signal subband is proposed. 400 kHz of spectrum from 903.0 to 903.4 MHz will be set aside exclusively for weak signal operations as part of the bandplan modifications. It is also important to note that the adjacent FM repeater subband below 903 MHz is for repeater inputs only. As such, weak signal operations in the 903.0 to 903.4 range should not be subject to recurring interference from strong signals as would be the case if repeater outputs were in this subband.

The current ARCC bandplan allocates 903-905 MHz to digital simplex and auxiliary links. As stated above, the lower 400 kHz of this subband will now be weak signal exclusive. The remaining 2.6 MHz will remain for digital operations, but be further segmented to better partition coordinated activities. One of these new subbands will be for digital repeater inputs paired with channels in the 917 MHz region to create digital repeater pairs with a -12 MHz offset. The remaining digital spectrum will be available for coordinated auxiliary links, with non-coordinated digital simplex activities sharing this spectrum on a secondary basis. Operating frequencies for digital repeaters and auxiliary links in these subbands will be selected and coordinated based on occupied bandwidth, i.e. a fixed channelization plan (such as 25 kHz channels) will not be used in order to maintain maximum flexibility and to encourage experimentation. Mixed polarities will be allowed in the digital subbands.

It is proposed that the 903-905 MHz region be reallocated as follows:

903.0000 - 903.4000	Weak signal modes (CW, SSB, EME, beacons)
903.4125 - 904.9875	Digital auxiliary links primary, digital simplex secondary (channels allocated based on OBW)
905.0250 - 905.9750	Digital repeater inputs (channels allocated based on OBW)

In order to provide digital repeater output spectrum paired with the 905 MHz input spectrum detailed above, the lower 1 MHz of the existing 915-918 MHz FM voice auxiliary link subband will be eliminated. No incumbent operations will be affected by this modification. The elimination of this 1 MHz of auxiliary link spectrum will be partially offset by the creation of the 927.0 to 927.3 MHz auxiliary link subband detailed earlier.

It is proposed that the 915-918 MHz region be reallocated as follows:

915.0250 - 916.9750	FM auxiliary links (25 kHz spacing)
917.0250 - 917.9750	Digital repeater outputs (allocated based on OBW)

FM SIMPLEX CHANNELS

Amidst the legacy 12 MHz repeater pairs are two channels recommended by adjacent coordination councils for FM simplex use. As a large segment of spectrum previously reserved from FM simplex activity is being eliminated in the instant proposal, these often-recommended FM simplex channels will be formally reserved in the revised bandplan. There presently does not exist any repeaters coordinated on these pairs, therefore there will be no displacement in reserving these channels for FM simplex use.

It is proposed that 906.5000 and 918.5000 MHz be removed from list of eligible 12 MHz split repeater pairs and reserved for FM simplex use.

CONCLUSION

ARCC believes that the bandplan modifications proposed herein will result in increased utilization of the 33cm band, improve protection of weak-signal operations, and make the most efficient use of the available spectrum in the overall interest of the amateur radio community in ARCC's service area.

COMMENT PERIOD

This proposal is hereby released for public review and comment. This release initiates a 60-day period during which time comments from the amateur community are requested. After the close of the comment period on October 5, 2008, ARCC's executive board will review the comments received and decide whether to ratify the bandplan changes proposed, or whether to amend the proposal, publicize the revised bandplan, and restart the comment period. ARCC encourages that this bandplan be circulated freely provided that the entire contents of this document are distributed without modification. If this document cannot be reproduced in its entirety in other publications or communications due to print space or bandwidth limitations, the following text shall be included (verbatim) in any abbreviated communication or publications to refer readers to the entire contents of this proposal:

Comments regarding this proposal should be sent via US mail to ARCC, P.O. Box 244, Plumsteadville, PA 18949, or electronically to info@arcc-inc.org. The 33cm bandplan revision proposal is available in its entirety at http://www.arcc-inc.org/33cm.pdf.

Revision History:

Initial Draft, J. DePolo WN3A, Q1 2008, uncirculated
Rev B, J. DePolo WN3A, March 10, 2008, limited release for preliminary comments
Rev C, J. DePolo WN3A, March 15, 2008, released at ARCC Board Meeting
Rev D, J. DePolo WN3A, August 8, 2008, public release

APPENDIX - Existing 33cm Bandplans

ARCC Current Bandplan (revised 1995):

902.0000 - 903.0000	Weak signal modes (CW, SSB, EME, beacons)
903.0000 - 905.9750	Digital simplex and auxiliary links
906.0000 - 909.0000	FM Voice Repeater Inputs (25 kHz spacing)
909.0000 - 915.0000	ATV Repeater Input or Output
915.0250 - 917.9750	FM Voice Auxiliary Links (25 kHz spacing)
918.0000 - 921.0000	FM Repeater Outputs (25 kHz spacing)
921.0250 - 921.9750	FM Simplex
922.0000 - 928.0000	ATV Repeater Input or Output

ARCC Proposed Bandplan Changes (2008 Rev. D) - subbands in bold are coordinated by ARCC:

902.0000 - 902.3000	Weak signal modes (CW, SSB, EME, beacons)	Modified
902.3125 - 902.4875	**Narrowband FM/DV repeater inputs (12.5 kHz spacing)**	**New**
902.5000	FM simplex	New
902.5125 - 902.9750	**Narrowband FM/DV repeater inputs (12.5 kHz spacing)**	**New**
902.9875	Narrowband SNP/portable repeater input	New
903.0000 - 903.4000	Weak signal modes (CW, SSB, EME, beacons)	New
903.4125 - 904.9875	**Digital auxiliary links primary, digital simplex secondary**	**Modified**
905.0250 - 905.9750	**Digital repeater inputs (channel spacing based on OBW)**	**New**
906.0250 - 908.4750	**FM repeater inputs (25 kHz spacing)**	**Unchanged**
906.5000	FM simplex	New
906.5250 - 908.9750	**FM repeater inputs (25 kHz spacing)**	**Unchanged**
909.0000 - 915.0000	**ATV repeater input**	**Unchanged**
915.0250 - 916.9750	**FM auxiliary links (25 kHz spacing)**	**Modified**
917.0250 - 917.9750	**Digital repeater outputs (channel spacing based on OBW)**	**New**
918.0250 - 920.4750	**FM repeater outputs (25 kHz spacing)**	**Unchanged**
918.5000	FM simplex	New
918.5250 - 920.9750	**FM repeater outputs (25 kHz spacing)**	**Unchanged**
921.0250 - 921.9750	*FM simplex*	Deleted
921.0000 - 927.0000	**ATV repeater output**	**Modified**
927.0125 - 927.3000	**FM auxiliary links (12.5 kHz spacing)**	**New**
927.3125 - 927.4875	**Narrowband FM/DV repeater outputs (12.5 kHz spacing)**	**New**
927.5000	FM simplex calling frequency	New
927.5125 - 902.9750	**Narrowband FM/DV repeater outputs (12.5 kHz spacing)**	**New**
927.9875	Narrowband SNP/portable repeater output	New

MetroCor Bandplan (revised 2007?):

902.0000 - 902.3000	Weak signal modes
902.3000 - 902.3750	CW beacons, experimental, mixed use
902.3125 - 902.9875	FM repeater inputs (902.5 FM simplex)
903.0000 - 903.3000	Weak signal modes
903.3000 - 903.3500	CW beacons
903.4000 - 905.0000	Experimental and mixed use
905.0000 - 906.0000	Digital links, experimental
906.0000	FM simplex
906.0000 - 906.5000	(unallocated)
906.5000	FM simplex
906.5000 - 910.0000	(unallocated)
910.0000	FM simplex
910.0000 - 917.0000	ATV and experimental
917.0000 - 918.0000	(unallocated)
918.0000	FM simplex
918.0000 - 918.5000	(unallocated)
918.5000	FM simplex
922.0000	FM simplex

922.0000 - 927.0000	Experimental and wide band repeaters
927.0125 - 927.300	FM auxiliary links
927.3125 - 927.9875	FM repeater outputs (927.5 FM simplex)
927.90	Beacon use

UNYREPCO Bandplan:

902.0-902.8	SSTV, FAX, ACSB, experimental
902.8-903.0	Reserved for EME, CW expansion
903.0-903.05	EME exclusive
903.05-903.07	Narrow-bandwidth, weak-signal communications
903.07-903.08	CW beacons
903.09-903.4	Narrow-bandwidth, weak-signal communications
903.1	CW, SSB calling frequency
903.4-903.6	Crossband linear translator inputs
903.6-903.8	Crossband linear translator outputs
903.8-904.0	Experimental beacons exclusive
904-906	Digital communications
906-907	Narrow bandwidth FM-simplex services, 25 kHz channels
906.50	National simplex frequency
907-910	FM repeater inputs paired with 919-922 MHz; 119 pairs every 25 kHz
910-916	ATV
916-918	Digital communications
918-919	Narrow-bandwidth, FM control links and remote bases
919-922	FM repeater outputs, paired with 907-910 MHz
922-928	Wide-bandwidth experimental, simplex ATV, Spread Spectrum

WPRC Bandplan:

902.000 - 903.000	MISC MIXED MODES (PER ARRL BAND PLAN)
903.000 - 906.000	PACKET 1.5 MBIT/S LINKS
906.000 - 909.000	FM REPEATER OUTPUTS
909.000 - 915.000	ATV REPEATER OUTPUT
915.000 - 918.000	PACKET 1.5 MBIT/S LINKS
918.000 - 921.000	FM REPEATER INPUTS
921.000 - 927.000	ATV REPEATER INPUT
927.000 - 928.000	FM SIMPLEX, LINKS

TMARC (SERA equivalent) Bandplan:

902.0000 - 902.2875	SSTV, FAX, ACSSB, Experimental
902.2125 - 902.4625	Auxiliary FM Duplex Link Input Frequency Pairs
902.4875 - 902.7250	FM Repeater Inputs & designated simplex
902.5000	FM Simplex Calling Channel (1 of 2)
902.7375 - 903.0500	EME Exclusive
903.0700 - 903.0800	CW Beacons
903.0800 - 903.1000	(unallocated – weak signal?)
903.1000	CW, SSB Calling Frequency
903.1000 - 903.4000	(unallocated – weak signal?)
903.4000 - 903.6000	Cross Band Linear Translator Inputs
903.6000 - 903.8000	Cross Band Linear Translator Outputs
903.8000 - 904.0000	Experimental Beacons Exclusive
904.0000 - 906.0000	Digital Communications
906.0000 - 907.0000	Narrow Band FM Simplex (grandfathered system - 25 KHz channels)
906.5000	Old National Calling Frequency (grandfathered)
907.0000 - 910.0000	FM Repeater Inputs (12 MHz split - 100 KHz spacing)
910.0000 - 916.0000	ATV
916.0000 - 918.0000	Digital Communications
918.0000 - 919.0000	Narrow Band FM Control Links/Remote Bases
919.0000 - 922.0000	FM Repeater Outputs (12 MHz split - 100 KHz spacing)
927.0125 - 927.9875	Auxiliary Simplex & Link Frequencies

927.2125 - 927.4625	Auxiliary FM Duplex Link Input Frequency Pairs
927.4875 - 927.7250	FM Repeater Outputs & designated simplex
927.5000	FM Simplex Calling Channel (2 of 2)
927.7375 - 927.7875	Old SERA FM Voice Simplex Channels (grandfathered)
922.0000 - 928.0000	Wideband Experimental, ATV, Simplex, Spread Spectrum

CSMA Bandplan (revised 2005):

902.0000 - 902.4000	Weak signal modes
902.4000 - 902.9000	FM Repeater Inputs
902.5000	FM simplex
902.9000 - 903.4000	Weak signal modes
903.4000 - 905.0000	Mixed used and experimental
905.0000 - 906.0000	Digital, links, and experimental
906.0000 - 910.0000	FM repeater inputs and auxiliary links
906.5000	FM simplex
910.0000 - 917.0000	ATV primary, experimental and mixed modes secondary
917.0000 - 918.0000	Digital links, experimental, and mixed modes
918.5000	FM simplex
918.0000 - 922.0000	FM repeater outputs and auxiliary links
922.0000 - 927.0000	Experimental and wideband digital repeaters
927.0000 - 927.4000	FM simplex and auxiliary links
927.4000 - 927.9000	FM repeater outputs
927.5000	FM simplex
927.9000 - 928.0000	Weak signal modes

ARRL Bandplan (last revised 1989):

902.0-903.0	Narrow-bandwidth, weak-signal communications
902.0-902.8	SSTV, FAX, ACSSB, experimental
902.1	Weak-signal calling frequency
902.8-903.0	Reserved for EME, CW expansion
903.1	Alternate calling frequency
903.0-906.0	Digital communications
906-909	FM repeater inputs
909-915	ATV
915-918	Digital communications
918-921	FM repeater outputs
921-927	ATV
927-928	FM simplex and links