

1. ORGANIZATION AND PURPOSE.

The CCARC is an organization of amateur radio clubs, associations, and individuals incorporated as a non-profit group under the laws of the State of Colorado. The CCARC is a voluntary association of amateur radio operators, repeater system owners, and interested parties.

The CCARC has collectively determined that the coordination of repeater systems is essential to maximize the finite spectrum resources allocated to amateur radio and minimize the interference between systems. The success of the CCARC coordination effort is solely dependent on those amateurs who actively cooperate and participate in spectrum management and contribute to the coordination processes.

The Frequency Coordinator is elected by majority vote of the current CCARC general membership on even numbered years. The Frequency Coordination Committee is a standing committee of the CCARC consisting of the Chairman of CCARC, The Vice-chairman, and The Frequency Coordinator and the appointed Frequency Coordination Staff.

2. BACKGROUND.

It is not the intent or the obligation of the CCARC to enforce the FCC's rules. We will enforce compliance with coordination policies. It continues to be the obligation of the individual coordination holder to ensure their system's compliance with the terms of their coordination and to provide updated and timely information when necessary.

All parties must realize that the amateur spectrum is a fragile resource and abuse can spoil it for everyone now and in the future. Voluntary coordination by its name implies cooperation. Any party wishing to develop and operate a repeater system should feel obligated to seek the synergy of existing repeater system operators through CCARC coordination, prior to placing any repeater system in operation. Coordinated systems have the full support of other coordinated systems.

The FCC has stated that where the transmission of a repeater causes harmful interference to another repeater, the two station licensees are equally and fully responsible for resolving the interference unless the operation of one station is recommended by a frequency coordinator and the operation of the other station is not. In that case, the licensee of the non-coordinated repeater has the primary responsibility to resolve the interference.

The CCARC will accept application from any duly licensed individual or amateur group and will issue a mailed coordination document, based on the following policies and procedures. However the CCARC reserves the right to deny requests for coordination to applicants who refuse to abide by these CCARC Coordination Policies and Procedures.

The CCARC coordinates established repeater pairs according to the appropriate Frequency Utilization Plan (FUP) outlined below. The CCARC will also attempt to de-conflict and protect repeater link frequencies when these frequencies are identified and actually in use by the submitting system. Such link frequencies and any access control information for them will remain unpublished and be available only to the Frequency Coordinator and Frequency Coordination Committee.

The boundaries of the CCARC coordination responsibility are only within the borders of the State of Colorado. The CCARC Frequency Coordinator will work with other frequency coordinators for those states having contiguous boundaries.

3. REPEATER COORDINATION GUIDELINES

a. Responsibilities:

1. **Applicants.** Applicants initiate requests for coordination via preliminary, informal discussions with the Frequency Coordinator, and finally by asking for and filling out a RSE Form. This form must be completely and accurately filled out for all requested information. The application is signed by the requestor attesting to the accuracy of all supplied information and forwarded to the Frequency Coordinator for review and approval.

2. **Frequency Coordinator.** The Frequency Coordinator conducts informal discussions with potential new system applicants to assist in frequency selection, provides a feel for the types of engineering data required for a coordination, and answers preliminary questions a new system owner/trustee may have.

The Frequency Coordinator also reviews coordination applications, determines whether the preliminary data discussed in informal conversations and that included on the RSE Form is complete and that the request for coordination, as received, can be accommodated. The Frequency Coordinator performs engineering studies to assure the compatibility of adjacent and co-channel systems.

3. **Coordination Committee.** The Coordination Committee receives the preliminary data for a new coordination request from the Frequency Coordinator at the time that a formal application is received. The Coordination Committee ensures that CCARC guidelines and policies are followed, and that a spirit of fairness is consistently applied for all applications.

4. **Local Area Liaisons.** The Frequency Coordinator may use Local Area Liaisons to assist his engineering studies when determining compatibility for local areas he or she may not be familiar with.

5. **Adjacent State/Region Coordinators.** The Frequency Coordinator will discuss with the appropriate coordinator any request that he or she feels requires adjacent state/region coordination.

b. Repeater System Coordination.

All new coordination applications shall indicate the availability of a form of access control such as CTCSS, DCS, Frequency Shift Data, DTMF, etc., except where an applicant can clearly demonstrate that COS operation will not cause interference.

All system coordinations are for specific:

1. Frequency pairs using standard offsets
2. Transmitter location (latitude and longitude)
3. Effective Radiated Power (ERP)
4. Radiation pattern (Use of directional antennas may be a required part of any given coordination)
5. Elevation (AMSL, AGL, HAAT)
6. Individual or designated trustee
7. Access/interference limiting measures such as CTCSS encode and decode usage.
8. A one-year period of time, with renewal contingent upon receipt of a completed and signed annually submitted RSE Form. Significant changes to system parameters identified on an annual RSE Form may require re-coordination.
9. Specific Transmitter Emissions Designator
10. Digital versus Analog Emission

All coordinations are reviewed and must be renewed annually.

The CCARC strongly promotes the following spectrum utilization concepts:

- a. All system owners/trustees are strongly encouraged to use access control/interference limiting methods to limit interference among systems.

b. New coordinations may require the use of access controls as a condition of coordination to limit interference now or in the future.

The CCARC reserves the following system coordination rights to:

1. Deny requests for coordination in congested bands or require the use of less congested bands. However, this action will only be taken after attempting to reasonably accommodate the request considering current technological capabilities.
2. Set aside frequencies for certain operating modes.
3. Limit antenna height and ERP.
4. Require special methods of access/interference limitation techniques such as: deviation limitation, directional antenna patterns, CTCSS tone encode and decode, Digital Coded Squelch, precise frequency control, etc. as a prerequisite for a coordination.

Repeater coordination information is considered public information. However, exact system parameters, especially control information, and the exact system location will not be revealed, for security reasons, outside the purview of the Frequency Coordinator and the Coordination Committee.

c. Spectrum/Frequency Sharing.

The following are CCARC guidelines for sharing the spectrum when coordinating repeater pairs:

1. The Frequency Coordinator will use his or her best engineering judgment to maintain system separation to minimize adjacent and co-channel interference. He or she will use such factors as the following: mileage separation, system overlap, ERP, existing coordinated adjacent and co-channel systems, modulation technique, propagation characteristics peculiar to the Colorado area, HAAT, etc.

The following defines the minimum separation criteria between co-channel and adjacent channel repeaters. These values serve as the minimum criteria in order to minimize interference between repeaters. If either the proposed repeater, or an existing co-channel or adjacent channel repeater, has a significant Effective Radiated Power (ERP) or high Height Above Average Terrain (HAAT), these values will need to be increased as deemed necessary by the frequency coordinator. Coordination requests are always considered on a case by case basis.

Additionally, coordination may require contact and approval with neighboring state coordinators that may, or may not, utilize different co-channel and adjacent channel criteria.

Suggested Co-channel distances:

Frequency Band	Co-Channel spacing (Sites below 1000' HAAT)	Co-Channel spacing (Sites between 1000' and 2000' HAAT)	Co-Channel spacing (Sites above 2000' HAAT)
29 MHz	100 miles	125 miles	150 miles
50 MHz	100 miles	125 miles	150 miles

144 MHz	100 miles	125 miles	150 miles
222 MHz	100 miles	125 miles	150 miles
440 MHz	100 miles	125 miles	150 miles
902 MHz	75 miles	95 miles	100 miles
1240 MHz and above	75 miles	95 miles	100 miles

Suggested Adjacent-channel distances:

Frequency Band	Adj-Channel spacing (Sites below 1000' HAAT)	Adj-Channel spacing (Sites between 1000' and 2000' HAAT)	Adj-Channel spacing (Sites above 2000' HAAT)
29 MHz	25 miles at 20 KHz	30 miles at 20 KHz	35 miles at 20 KHz
50 MHz	25 miles at 20 KHz	30 miles at 20 KHz	35 miles at 20 KHz
144 MHz	50 miles at 15 KHz	60 miles at 15 KHz	70 miles at 15 KHz
222 MHz	25 miles at 20 KHz	30 miles at 20 KHz	35 miles at 20 KHz
440 MHz	0 miles at 25 KHz 0 miles at 12.5 KHz	10 miles at 25 KHz 10 miles at 12.5 KHz	15 miles at 25 KHz 15 miles at 12.5 KHz
902 MHz	0 miles at 25 KHz 0 miles at 12.5 KHz	10 miles at 25 KHz 10 miles at 12.5 KHz	15 miles at 25 KHz 15 miles at 12.5 KHz
1240 MHz and above	0 miles at 25 KHz 0 miles at 12.5 KHz	10 miles at 25 KHz 10 miles at 12.5 KHz	15 miles at 25 KHz 15 miles at 12.5 KHz

2. Receive coverage of a repeater is a large factor in determining the coverage of a system. Those systems with a number of voting receivers, receivers at elevations higher than the repeater transmitter, or systems operating with excessive transmitter power should not be afforded extended coordination protection.

3. Repeater DXing by users may cause unintended interference to adjacent or co-channel systems, but is not a matter for CCARC action.

4. System users located at high elevations must expect some co-channel or adjacent channel interference and take local measures to limit such interference. Use of directional antennas or tone decode features may limit such interference.

d. Changes in Access Method, Height, Power, Frequency, or Location

Coordination is based upon information provided at the time of submission by the applicant and contained on the CCARC RSE Form. If a coordination holder "significantly" * changes the location, access method, antenna height or pattern, Effective Radiated Power, frequency, or other operating parameters of his or her system, the repeater will be required to be re coordinated. The CCARC Frequency Coordinator shall be notified in writing on a new RSE Form. Re-coordination is required to verify that interference to or from other repeaters does not occur. Re-coordination is not to allow another repeater or proposed repeater or new repeater system owner to be assigned to the frequency. See the Transfer Of Coordination, Section 8 below.

Note: * "Significantly", as used above, is defined as a power change of 1 dB, an antenna height change of more than 25 feet or a horizontal move of more than 1500 feet. For the 1dB power change calculation, the CCARC uses a factor of .75 or 1.25 of the original power. For example, a 100-watt ERP station multiplied by .75 would be 75 watts, or multiplied by 1.25 would be 125 watts.

4. PROCESSING FEES

No fees will be collected at this time. However, the CCARC reserves the right to collect fees for processing original, modified, or renewal applications in the future.

5. APPLICATION PROCESSING

a. Preliminary Discussions.

An applicant for coordination may request a specific frequency or request assistance in selecting one from the Frequency Coordinator.

The preliminary discussions between an interested party/group and the Frequency Coordinator may be in the form of informal phone calls, email, or US mail.

The following areas must be considered:

1. Band/frequency
2. Location-Latitude/Longitude
3. Height Above Average Terrain (HAAT)
4. Realistic expected system usage, average in-use time per day
5. Acceptability or non-acceptability of co-channel operation
6. Type of access control - a commonly used access control method, such as CTCSS or DCS, **must** be available for system usage
7. Expected coverage area.

8. The potential for interference
9. System Type: Analog or Digital
10. For those proposed systems near a border, Frequency Coordinator discussion with the adjacent coordinator
11. Discussions with local area liaisons as required by the Frequency Coordinator

Other typical detailed questions that come up during the coordination process may be posted on the CCARC web site for reference or made available upon request via US mail.

b. Formal Application Process

An individual or group makes a formal coordination request by asking for a RSE Form from the Frequency Coordinator. This request for an RSE Form must be in writing and addressed to the CCARC Frequency Coordinator either by US Mail or via email in PDF format. All forms must be signed.

Requests for coordination received by the Frequency Coordinator shall be acted upon on a first come, first served basis. In case of conflicting applications, the verifiable date of a written request for a RSE Form will be used to resolve the conflict.

When a written request is made, a very tentative agreement exists. The Frequency Coordinator responds to the written request with any additional questions he or she may have for the applicant. When any additional questions are satisfactorily answered, the Frequency Coordinator responds within 14 days by sending a RSE Form.

The Frequency Coordinator will work with the Frequency Coordination Committee when a new coordination request has been received.

The completely filled out and signed RSE Form must be returned to the Frequency Coordinator.

When a completed and signed RSE Form is received and verified by the Frequency Coordinator, it begins its coordination process. When complete, the applicant will receive a Notice of Frequency Coordination document or NoFC or an indication that the application was rejected.

1. A construction period is established for a period of 6 months to allow activation of the system. The "no activity" rule described below for system de-coordination does not apply during this period.
2. The system owner/trustee must notify the Frequency Coordinator in writing when the system is activated on the CCARC activity form.
3. A coordinated system with no user activity for a 90-day period is subject to de-coordination, requiring a new full re-coordination process.
4. System owners/trustees must provide timely responses to the Frequency Coordinator's request for biannual recertification.
5. For co-channel authorizations, the new system should request co-channel user agreements letters. If agreement cannot be obtained from existing co-channel users, and the request/assignment is viable in

the Frequency Coordinators judgment, the Frequency Coordinator may initiate a test period to evaluate co-channel operation.

6. In special cases, as determined by the Frequency Coordinator, full-time CTCSS encode and/or decode may be required.

7. Any other special conditions that are deemed appropriate by the Frequency Coordinator.

c. Coordination Certification.

Upon satisfactory completion of the above actions, The Frequency Coordinator will issue a Notice of Frequency Coordination, if no issues have been identified. A file copy of the Notice of Frequency Coordination will be maintained in the Frequency Coordinator files.

6. RESPONSIBILITIES OF COORDINATION HOLDERS

It is the responsibility of the coordination holder to keep the CCARC informed on the status of the system by having an up-to-date RSE Form on file with the Frequency Coordinator at all times.

All communication regarding coordination, except any early preliminary discussions for a new system, shall be in writing. Verbal communication shall not be binding. It is the system owner or trustees responsibility to ensure the CCARC is in receipt of any correspondence.

Absent special circumstances, any correspondence from the CCARC shall be directed to the coordination holder. To facilitate this correspondence the address stated on the RSE Form must be his/her home or personal post office box or if an organization, the organizations official address. A trustee or designated second point-of -contact and phone number must also be listed.

Where an organization is the sponsor of a repeater, the coordination holder for such a repeater must be an individual of proper amateur radio license class appointed by the organization to act as system trustee. Notification of any system changes to the coordinated system or system status must be by a new CCARC RSE Form submitted and signed by the system owner or if an organization, the trustee. Minor changes like Trustee, Callsign or Features such as AP or IRLP may be done by simple notification.

Coordination holders must sign and return the annual RSE Update Form with any updated system data.

Coordination holders operate in a spirit of good faith to resolve any interference problems being experienced with other coordinated systems.

7. CANCELLATION OF COORDINATION

Any significant station parameter change, as specified on the approved RSE Form, made without prior approval by the CCARC can result in cancellation of the coordination. (See the Changes to Access Method, Height, Power, Frequency, or Location paragraph above).

The Frequency Coordinator may, at his or her discretion, cancel the coordination of a system for the following reasons:

1. For failure to occupy and utilize the frequencies as described by the RSE Form for a period of 6 months during construction, without the prior approval of the Frequency Coordinator.

2. For failure to notify the Frequency Coordinator, within the 6-month construction period, that the system has been activated.

3. For no user activity on a system for a 90-day period.
4. For operating in violation of CCARC coordination policies.
5. For operating in violation of established CCARC Band Plans.
6. For any system not operating according to good engineering and operating practices. Such poor engineering and operating practices include but are not limited to: over deviation, operating off frequency, operating an excessively unbalanced system (high transmitter power compared to receiver coverage), etc.
7. For failure to renew a coordination during the biannual recertification process using a completed CCARC RSE Form. This form must be updated and returned to the Frequency Coordinator within 30 days, at least every two years during the biannual review period.

A 90 day grace period will exist after a coordination is canceled wherein the holder may renew the certificate by reapplying using a CCARC RSE Form.

8. TRANSFER OF COORDINATION

A coordination for an existing frequency can be transferred to another individual or group provided:

1. Both parties are in agreement.
2. The new proposed coordination holder agrees to abide by the CCARC Coordination Policies and Procedures and applies to the CCARC for coordination.
3. There are no reasonable objections to the transfer by other coordination holders of the CCARC.
4. There will be no changes in the operating parameters of the system, including system location. Location changes make systems NOT transferrable and will require a new coordination.
5. The new coordination holder agrees to all CCARC FUP guidelines and the annual recertification process.

9. PACKET COORDINATION

The following is the CCARC policy regarding Packet Radio Systems:

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

4. The CCARC shall not make any attempt to list; or other wise recognize any DIGI/Packet system and or frequency of operation in its data base or publication other than those systems that utilize standard band plan frequencies and have a valid coordination.

5. In congested areas, packet usage should be encouraged to stay within the Colorado normal two-meter packet frequency allocation of 144.900 to 145.000 MHz.

10. SHARED NON-PROTECTED REPEATERS

A. Shared Non-Protected (SNP) Repeaters

The Frequency Coordinator has established several Shared Non Protected (SNP) repeater pairs, which do not require formal coordination. Individual users determine the best frequency and CTCSS tone for their usage but may request assistance from the Frequency Coordinator. SNP systems may be registered by frequency and CTCSS tone to assist in de-confliction. Other guidelines for the use of these frequencies are:

1. All users of SNP channels shall share the use of the frequency.
2. Users receive no protection from other co-channel users.
3. All systems shall utilize CTCSS access or other approved method of limited access. No Carrier Squelch operation of any kind is permitted.
4. Operation of SNP systems shall be on a non-interference basis with existing coordinated systems.
5. Use of SNP frequencies shall be restricted to only voice and non-linked modes.
6. SNP pairs are listed in the CCARC Frequency Utilization Plan (FUP) documents as published on the CCARC web site.

B. Emergency and Special Event (E&SE) Repeaters

The Frequency Coordinator has established several Emergency and Special Event (E&SE) repeater pairs. Formal coordination is not available for E&SE repeaters since it is assumed that these temporary repeaters will be in portable operation. Guidelines for the use of these frequencies are:

1. All users of E&SE channels shall share the use of the frequency.
2. Users receive no protection from other co-channel users.
3. All systems shall utilize CTCSS access or other approved method of limited access. No Carrier Squelch operation of any kind is permitted.
4. Operation of ESE systems shall be on a non-interference basis with existing coordinated systems.
5. Operation is expected to be temporary in nature, and will not exceed the duration of the emergency or special event. No permanent operation on these frequencies is permitted.
6. ESE pairs are listed in the CCARC Frequency Utilization Plan (FUP) documents as published on the CCARC web site.

11. TECHNICAL REQUIREMENTS.

All CCARC coordinated repeater systems and any link frequencies are expected to adhere to the following technical standards:

- a. Maintain frequency accuracy to .005 percent.

- b. Limit retransmit frequency deviation based on occupied bandwidth.
- c. Limit maximum ERP to 400 watts.
- d. Use standard frequency offsets and pair splits according to the Colorado Band Plan.
- e. Maintain a well-balanced system with transmit and receive coverage fairly equal.

12. COLORADO BAND PLANS.

The Colorado Council of Radio Clubs coordinates repeaters on all bands in the State of Colorado. Frequency bands are segmented into blocks with channel spacing, use type (simplex, repeater, auxiliary use), maximum emission bandwidth, and modulation type (digital versus analog) identified.

For individual pairs and band plans, refer to the appropriate Frequency Use Plan (FUP) available on the CCARC's website at <http://www.ccarc.net>.

13. APPEALS PROCESS FOR COORDINATION REQUESTS

Any applicant whose request for coordination has been denied by the Frequency Coordinator or the Frequency Coordination Committee may be appealed using the following procedural steps:

A. The Initial Appeal to the Executive Board of Directors:

An applicant begins the appeals process by filing a request with the Executive Board of Directors of the CCARC. This request is made directly to the Chairman of the Board of Directors and begins a review process where the Board of Directors reviews the application and the Frequency Coordinator's or the Frequency Coordination Committee's reason(s) for denial or modification of a request and votes to either uphold the Frequency Coordinator's or the Frequency Coordination Committee's decision or remands it back to the Frequency Coordinator with a decision for approval of the request.

After the Frequency Coordinator or the Frequency Coordination Committee denies a request, they may, at their discretion, make an appeal to the Executive Board of Directors of the CCARC and ask the Executive Board of Directors for a definitive ruling upholding or overruling their decision.

B. The Final Appeal to the Members of CCARC:

If, as a result of the initial appeal, the applicant wishes to further appeal the ruling made by the Executive Board of Directors of CCARC; the applicant may submit a request to the Chairman of the Board of Directors stating that the applicant wishes to appeal the decision to the delegates of the membership of CCARC who are coordination holders.

The Chairman of the Board of Directors or his designated hearing official will request that the applicant submit in writing all arguments and information relating to the matter for dissemination to the membership.

The Chairman of the Board of Directors or his designated hearing official will request that the Frequency Coordinator and or the Frequency Coordination Committee make available in writing all arguments and information relating to the matter for dissemination to the membership.

This information shall be in an electronic format suitable for email distribution to the delegates thirty days prior to the next regularly scheduled CCARC General Membership meeting.

The applicant and or their representatives and the Frequency Coordinator and or Frequency Coordination Committee's representatives will both be allotted thirty (30) minutes to present their information at the meeting. CCARC will supply the seated delegates paper copies of all the documentation that was previously submitted by both sides. There will be no other written documentation introduced at the hearing, all documentation must have been submitted during the original submission that the delegates received thirty days prior to the scheduled meeting.

At the conclusion of the presentation by the applicant and or their representatives and the Frequency Coordinator and or Frequency Coordination Committee's representatives, the delegates who are coordination holders will be issued paper ballots. The teller committee will consist of two members selected by the applicant and or their representatives, two members selected by the Frequency Coordinator and or Frequency Coordination Committee's representatives and the CCARC Treasurer. The delegates will be asked to uphold or overrule the denial.

The decision of this body will be final.

14. GLOSSARY

AGL-Above Ground Level

AMSL-Above Mean Sea Level

CCARC-Colorado Council of Amateur Radio Clubs

COR-Carrier Operated Relay

COS-Carrier Operated Squelch

CTCSS-Continuous Tone Coded Squelch System

DCS-Digital Coded Squelch

DTMF-Dual tone, multi frequency

ERP-Effective Radiated Power

ESE – Emergency and Special Event

HAAT-Height Above Average Terrain

RSE Form-Repeater System Evaluation Form

SNP-Shared Non-protected Pair