

## Section 1: The Framework: How You Fit In

### Topic 1

#### Introduction to Amateur Radio Emergency Communications

### Objectives

#### Welcome to Topic 1.

This topic will introduce you to the general concepts of public service communication. It will help prepare you to be the most helpful you can be as a volunteer.

#### Student preparation required:

You should have a sincere interest in improving your skills as a communications volunteer.

As you begin this series of courses, let us first thank you for choosing to expand your knowledge of Amateur Radio public service communications. Our professionalism and the effectiveness of our public service efforts will be greatly improved if we all share a common base of knowledge, skills, and procedures.

In this course, you will learn new skills and new ways of thinking about existing skills. Sometimes the way “we have always done something” is no longer useful or appropriate. We hope that this course will challenge you to become the best emergency communicator possible.

You may have ideas and material that could add to the base of knowledge presented here. Simply make a note of them and include them in the course evaluation form at the end of the course. Since our methods and techniques must continually adapt to meet the needs of the communities and agencies we serve, so must this course. We will periodically update this course, taking into consideration comments from all participants.

### What a Communications Emergency Is

A communications emergency exists when a critical communications system fails or is overloaded and puts the public at risk. A variety of circumstances can overload or damage critical day-to-day communications systems. It could be a storm that knocks down cellular sites, telephone lines, or radio towers; a massive increase in the use of a communication system that causes it to become overloaded; or the failure of a key component in a system which has widespread consequences. Examples are easily found. Violent storms and earthquakes may

impact communications infrastructure. Critical facilities can also be damaged in “normal” circumstances: underground cables are severed, fires occur in telephone equipment buildings, or a car crash knocks down a key telephone pole. Hospital or 911 telephone systems can fail. Even when no equipment fails, a large-scale emergency such as a chemical or nuclear incident can result in system overload or failure. Some emergency operations occur in areas without any existing communication systems, such as with backcountry searches or fires.



## What Makes a Good Communications Volunteer

Communications volunteers come from a wide variety of backgrounds and with a range of skills and experience. The common attributes that all effective volunteers share is a desire to help others without personal gain of any kind, and the ability to work as a member of a team and to take direction from others. Emergency communications volunteers need to be able to think and act quickly, under the stress and pressure of an emergency.

You cannot help others when you are worried about those you love. Your family should always be your first priority. Adequate personal and family preparation will enable you to get your own situation under control more quickly so that you are in a position to be of service to others.

## Where You Fit In

Amateur Radio operators (often called “hams” or “ham radio operators”) have been a communication resource in emergency situations ever since radio has existed. To the agencies they serve, amateurs are immediately available communication experts. Amateurs have the equipment, the skills, and access to the necessary frequencies, along with a diversified network

of stations at homes, emergency operations centers, and served agencies to provide added communications capacity during times of emergency or disaster. They are licensed and preauthorized for national and international communication.

Hams have the ability to rapidly enlarge their communication capacity to meet growing needs in an emergency, something commercial and public safety systems cannot normally do. Many of the skills are the same ones that are used in everyday ham activities. However, just having radios, frequencies, and basic radio skills is not enough. Certain emergency communication skills are very different from those you use in your daily ham radio life. Courses like this one help fill that need, as do local training programs and regular emergency exercises. Without specific emergency communication skills, you can easily become part of the problem rather than part of the solution.

As you might expect, technical and operating skills are critical. Just as important, though, is your ability to function as a team player within your own organization and the organization you are serving. Those critical skills will also be covered in this course.

## **What You Are Not**

**As important as what you are, is what you are not.** There are limits to your responsibilities as an emergency communicator, and it is important to know where to draw the line.

**You are not a “first responder.”** Except in rare cases of chance, you will seldom be first on the scene. You do not need flashing lights and sirens, gold badges, or fancy uniforms. In most cases, beyond reporting the situation to the proper authorities, ham radio operators have little usefulness as communicators at the very beginning of an emergency.

**You have no authority.** In most cases, you cannot make decisions for others, or make demands on the partner you serve or any other partner. The only decisions you can make are whether or not to participate, and those affecting your own health and safety.

**You cannot do it all.** When the partner you are helping runs short of doctors, cooks, or traffic cops, it is not your job to fill the void. In most cases, you are not trained for it. That does not mean you cannot lend a hand to fill an urgent need when you are qualified to do so, or perform other jobs for the partners, of which communication is an integral part, and for which you are trained and capable.

**You are not in charge.** You are there to temporarily fulfill the needs of a partner whose communication system is unable to do its job. They tell you what they need, and you do your best to comply.

## **“Day-to-Day” Versus “Emergency” Communication**

In your daily ham radio life, there is no pressure to get any particular message through. You do

things at your leisure, and no one's life depends upon you. In an emergency all that changes. Here are some differences you may see:

Unlike general Amateur Radio activities, which involve primarily Amateur Radio operators, emergency communication involves both Amateurs and non-Amateurs.	Unlike regular activities, emergency operations happen in real time. Important activities cannot be delayed for convenience.
Instead of one leisurely net a day, emergency communicators are often dealing with several continuous nets simultaneously to pass critical messages within a limited timeframe.	Unlike public service events that are scheduled and planned, emergency communicators are often asked to organize and coordinate field operations with little or no warning.
Unlike public service events where the communicators serve primarily under the direction of one lead organization, emergency communicators may need to interact with several key organizations simultaneously.	Unlike typical home installations, emergency stations must be portable and able to be set up and operate anywhere in a very short time.
Unlike contesting, which involves contacting any station for points; emergency communicators need to contact specific stations quickly to pass important messages. Teamwork is important, not competition between stations.	Unlike Field Day, where you can plan on a two-day operation, emergency operations have no schedule and are likely to continue for at least several days.
Unlike commercial communication solutions, where there is no reserve capacity for handling a sudden and massive increase in communication volume, Amateur Radio emergency communicators have the equipment, skills, and knowledge to create additional capacity in a very short time.	

## The Missions

The job you are asked to do will vary with the specific partner you serve. If that partner is the American Red Cross (ARC), you may be providing the communications needed to maintain a system of shelters and other relief efforts. If it is a state or local emergency management partner, you could be handling inter-partner communications or serving as the eyes and ears of the emergency managers. When a hospital's telephone system fails, you might be handling the "mechanics" of communicating so that doctors and nurses can concentrate on patients. In a large forest fire or search and rescue operation, you might be setting up personal phone patches for firefighters or rescuers to their families or assisting with logistical communications to ensure that food, supplies, personnel, and materials arrive when and where needed. For the National Weather Service (NWS), you will be reporting storm locations and weather conditions so that NWS personnel can better inform and warn the public. In any widespread disaster, hams could be assisting all the agencies listed above, and more, at the same time.

## **Communicating — Job #1**

While you are proud of your skill as a radio operator, and of the impressive equipment and systems you have in place, it is important to remember that your job is *communicating*. If a partner asks us to deliver a long shelter supply list to headquarters, you should be prepared to use the most expedient and efficient means at your disposal; this may be by phone, e-mail, or radio. Our job is to get the message through. Do not think about how to use ham radio to send the message — just think about the best and fastest way to send it. If that means using ham radio, so much the better. If all you have is CB or Family Radio, use it. If a partner asks you to use their radio system, do it. Your operating and technical skills are just as important as your ham radio resources.

## **Anatomy of a Communications Emergency**

In the earliest stages of many disasters, there is no immediate need for emergency communications services. (An obvious exception would be a tornado or earthquake.) This phase might occur during a severe storm “watch” or “warning” period. You should use this time to monitor developments and prepare to deploy when and if a request for assistance comes. Some nets, such as the Hurricane Watch Net (HWN) or SKYWARN, may be activated early in the storm watch or warning phases to provide the National Weather Service and other agencies with up-to-the-minute information.

Once a potential or actual need for more communications resources is identified, a partner puts out the call for its volunteer communicators. Depending on the situation, operators and equipment might be needed at an Emergency Operations Center (EOC) or to set up in field locations, or both. In some areas, a Rapid Response Team (RRT) or similar small sub-group might deploy a minimal response within a very short time, to be backed up by a second, more robust response within an hour or two.

Once operations begin, all kinds of things can happen. The volume of messages can grow quickly, and confusion is common. In addition to handling messages, your team will need to think about relief or replacement operators, food and water, sleeping accommodations, batteries, fuel, and other logistical needs. Plan for the failure of radios and antennas and how to replace them. Some operators will need to leave early for personal reasons.

Communications assignments might include staffing a shelter to handle calls for information, supplies, and personnel, “shadowing” an official to be their communication link, gathering weather information, or collecting and transmitting damage reports. Some nets might pass health and welfare inquiries to refugee/evacuee centers or pass messages from refugees to family members outside the disaster area. Other nets might handle logistical needs for the partners, such as those regarding supplies, equipment, and personnel.

Nets will be activated, rearranged, and dismantled as needs change. Volunteers will need to remain flexible in order to meet the changing needs of the partners. Over time, the need for

emergency communications networks will diminish as the message load decreases, and some nets will be closed or reduced in size. Operators will be demobilized (released to go home) one by one, in small groups, or all at once as the needs dictate.

Not long after the operation has ended, the emergency communications group should review the effectiveness of its response, either alone or with the partners. This might be done on the air in a formal net, by e-mail, or in a face-to-face meeting. However, it is done, it should occur as soon as possible after operations have ended to be sure that events are fresh in everyone's minds. Evaluations, done properly, can greatly improve your organization's — and your own — effectiveness.

## **Reference Links**

*ARES Manual*

<http://www.arrl.org/files/file/Public%20Service/ARES/ARESmanual2015.pdf>

*ARES Field Resources Manual*

<http://www.arrl.org/files/file/Public%20Service/ARES/ARESFieldResourcesManual-2019.pdf>

## **Review**

Communications emergencies can result from a variety of situations, including storms, earthquakes, fires, and equipment damage or failure. Normal communications systems are rapidly overloaded by the increase in usage caused by an emergency, and most have little or no reserve capacity. Amateur Radio operators are a national resource in a communications emergency, and your mission will vary with the partner you serve. Ham radio operators have the skills, equipment, and frequencies to rapidly expand the message-carrying capacity of their networks. Specific emergency communications skills are also required to meet the special needs of a communications emergency.

## Section 1: The Framework: How You Fit In

### Topic 2

#### Amateurs Presenting a Professional Image

### Objectives

#### Welcome to Topic 2.

This topic will help you appreciate the critical and delicate relationship between radio amateurs and the partners they serve.

#### Student preparation required:

None.

### What Your Attitude Has to Do with Communications

In a word, everything! It is even more important than your radio skills. Historically, the attitude of some Amateur Radio volunteers has been our weakest point.

In situations when a professional and helpful attitude is maintained, partner agencies point with pride to ham radio operators' efforts and accomplishments. The opposite is clearly illustrated in the words of one emergency management official who said, "Working with ham radio operators is like herding cats — get them the heck out of here!" This man was clearly frustrated with the attitude of his volunteers.

The use of the word "amateur" in our designation means simply that we are not paid for our efforts. It need not imply that our efforts or demeanor will be anything less than professional. "Professionalism" means the job is done with a high degree of competence and skill.

No matter which partner agency you serve — emergency management, National Weather Service (NWS), or the American Red Cross (ARC), it is helpful to remember that public service communications volunteers are like unpaid employees. If you maintain the attitude that you are an employee of the partner you are serving, with all that that employee status implies, there is little chance for you to go astray. You are there to add communications capacity and, in so doing, help the agency or organization accomplish its mission.

### Who Works for Whom

The relationship between the volunteer communicator and partner agencies will vary somewhat from situation to situation, but the fact is that *you* work for *them*. It doesn't matter whether you are part of a

separate radio group like the Amateur Radio Emergency Service (ARES®), or part of the partner's regular volunteer force. You still work for them.

Your job is to meet the communication needs of the partners — period. It is not to show off your fancy equipment, or to impress anyone with your knowledge of radio and electronics. A “know-it-all” or “I will show you how good I am and how inadequate you are” attitude will end your — and our — relationship with the partners in a hurry.

It is often said that volunteers don't have to take orders. However, when you volunteer your services to an organization, you implicitly agree to accept and comply with reasonable orders and requests from your “employer.” If you do not feel comfortable doing this, do not volunteer.

There may be times when you find yourself unwilling or unable to comply with a partner's demands. The reasons may be personal or related to safety or health, or it may be that you do not consider yourself qualified or capable of meeting a particular demand. On rare occasions, it may be that you are asked to do something not permitted by Federal Communications Commission (FCC) rules. Regardless of the reason, respectfully explain the situation, and work with the partner or your superiors in the communication group to come up with an alternative solution. If the discussion with the partners becomes difficult or uncomfortable, you can always politely pass the discussion up to your immediate emergency communications superiors so that they can handle it instead.



## **Performing Non-Communication Roles**

It has been said many times that our job should be strictly limited to communication. But is this a hard and fast rule? When you work as a SKYWARN weather spotter, or collect and relay damage reports for the Red Cross, is this not going beyond your role as a communicator?

Well, yes and no. The old model of the public service communicator was one in which a written message would be generated by the partner and handed to the radio operator. The radio operator would format and transmit the message to another station, whose operator would then transcribe it out and deliver it to the addressee. In this role, ham radio operators were strictly communicators, and due to the radio technology of the times, that was appropriate. Except for rare occasions and situations, those days are gone forever.

Today, message ownership is expected to stay with the person that composes the message to be sent or the reply. Some emergency communications groups may still enforce a “communication only” policy, and in some agencies the old model may still be appropriate but discuss this with your Emergency Coordinator or appropriate supervisor to be sure.

In today’s fast-paced emergency responses, there is often no time for this sort of system. Events are happening too quickly, and the partner’s communications must move at the same speed. The job description will more likely be “any function that also *includes* communication,” as defined by the partners. For this reason, emergency communication groups should engage in preplanning with the partners to ensure that these jobs are clearly defined, and that any additional job-specific training required is obtained in advance.

In general, emergency communications groups should be prepared to perform jobs for their partners that include the need to communicate. Here are a few of the many possible job descriptions:

- Radio operator, using amateur or partners’ radio systems
- Dispatcher, organizing the flow of personnel, vehicles, and supplies
- Resource coordinator, organizing the assignments of disaster relief volunteers
- Field observer, watching and reporting weather or other conditions
- Damage assessor, evaluating and reporting damage conditions
- Van driver, moving people or supplies from location to location
- Searcher, also providing communication for a search and rescue team
- Technical assistance, assist in setting up computer networks, charging stations, or generator power

To perform these jobs, you may need to complete task-specific training courses and take part in exercises and drills in addition to those required for emergency communication even beyond traditional Amateur Radio. In the ever-changing world of emergency response, this flexibility will become increasingly important if we are to continue our contribution to public safety as Amateur Radio operators.

Just as important as being prepared to embrace roles that involve an expanded understanding of “communication” is respecting the limits of your role to provide communication externally, specifically to the press. Avoid giving any information to the press until you understand both the partner’s and your own emergency communications group’s policies on speaking to the press. Most groups will want all information to come from a central official source, such as a “public information officer.” The role of a Public Information Officer (PIO) will be covered in more detail in a later topic.

## **Specific Partner Relationships**

The relationship between the volunteer communicator and the partners can be quite different from partner to partner, and even between different offices of the same partner. While ARRL and other national communication groups have existing “Memoranda of Understanding” (MOU), sometimes individually called a “Statement of Understanding” (SOU) or “Statement of Affiliation” (SOA), in place with many served agencies that define our general relationships, the actual working relationship is more precisely defined at the local level. Different people have different ideas and management styles. Agencies in one area can have different needs from those in other areas, and these can affect the working relationship between the partner and its emergency communications volunteers. Emergency communications groups

often have their own written agreements with the partner's local office.

**ARES and Local MOUs:** While having an MOU is a good thing and can help clarify roles before problems actually happen, groups operating within the ARES program need to remember that they are making promises for the whole ARES organization. As such, these local MOUs and agreements must be reviewed before they are signed. Talk to your DEC or SEC when considering making a local MOU. They can help you do it correctly.

Here are some examples of relationships:

**Department of Homeland Security (DHS):** In June 2003, ARRL and DHS signed a Statement of Affiliation, making ARES an affiliate member of DHS's Citizen Corps community readiness program. The agreement provides for training and an accreditation of ARES members, raising public awareness of Amateur Radio's role in emergency communications, and coordination of shared activities.

**Federal Emergency Management Agency (FEMA):** In most cases, Amateur Radio operators will have little direct contact with FEMA and other federal agencies, except within the Military Auxiliary Radio System (MARS) and at the national level with ARRL.

**American Red Cross** chapters may have their own communication teams that include amateurs, or they may have an SOU with a local ARES group or radio club. Typical assignments include linking shelters and chapter houses, performing damage assessment, handling supply and personnel logistics, and handling health and welfare messages.

**The Salvation Army** maintains its own internal Amateur Radio communication support group, known as the Salvation Army Team Emergency Radio Network (SATERN). In some areas, ARES or other groups provide local communication support. Assignments are similar to the Red Cross'.

**State and Local Emergency Management:** Some state and local emergency management agencies include Radio Amateur Civil Emergency Service (RACES) teams as part of their own emergency communication plan. In a growing trend around the country, ARES members are also RACES and vice versa. Communication assignments may be similar to the Red Cross' and Salvation Army's, but they may also include government command and control, and inter-partner communications.

**SKYWARN<sup>®</sup>** is a self-contained program sponsored by the National Weather Service, and not all members are Amateur Radio operators. Many use other radio systems or telephone, fax, or email to send in weather observations. SKYWARN volunteers collect on-the-spot weather observations that will allow forecasters to create forecasts that are more accurate and issue timely warnings.

## **Volunteering Where You Are Not Known**

In some cases, an emergency occurs in a neighboring area where you are not a member of the responding communication group. For whatever reason, you might like to offer your services. Make your offer through formal leadership channels before making any significant preparations or leaving home. Most ARES and other response groups will have protocols for bringing in volunteers from outside of their area if they are needed. Work with them. Trying to short-circuit their processes will just add an unnecessary obstacle to the workload of the local group(s).

It is possible that your offer might be welcomed, but it is equally possible that it will be refused. There are

good reasons for this, particularly in places where the partners have specific requirements, such as specialized training, official IDs, and time-consuming background checks.

Most communications managers prefer to work only with operators whose abilities and limitations they know. They may also have more volunteers than they need or may feel that your skills or equipment are not suited to their mission. If you are turned away, please accept the situation gracefully.

On the other hand, if your offer of assistance is accepted, the situation you find may vary quite a bit. In a well-organized effort, there will be someone to help orient you to the response effort, provide any required information and answer your questions. Your assignment will be clear, a relief person will be sent along at the end of a predefined shift, and you will know of any arrangements for food, sanitation, and sleep. If the effort is not well-organized, little if any of the above scenario could be true. You might be given an assignment, but with little additional information or support. In this case, you will need to improvise and fend for yourself, and you should be prepared to do so. This is one good reason for making your offer of assistance in advance. Learn as much as you can about the response before preparing to leave home.

In any event, the best time to offer your services to an emergency communications group is well before any emergency occurs. This will allow you to obtain the proper training and credentials, and to become known to the group's managers. When the time comes to serve, you will be ready for your job, and a job will be ready for you.

## **Workers' Compensation Coverage and Legal Protections**

In some states, Workers' Compensation insurance coverage can be extended to volunteers working on behalf of a government or nonprofit partner. However, Workers' Compensation law is a rather complex matter, regulated by each state's laws. In many cases, it may not be possible for volunteers who are not also paid employees of a partner to be covered by Workers' Compensation. Emergency communications managers should investigate their state's laws on this subject rather than assume that the partner's Workers' Compensation coverage will automatically apply.

Volunteers providing services to government agencies or to private organizations exempt from income taxes under Section 501(c)(3) of the Internal Revenue Code (IRC) are provided immunity from liability by federal law through the Volunteer Protection Act of 1997, 42 U.S.C. Section 14501. This law generally limits liability if the volunteer was acting at the time within the scope of official duties under a volunteer program. There are exceptions; the law does not cover volunteers who cause harm while operating motor vehicles, or if the volunteer is grossly negligent or engages in criminal acts. The statute, however, provides broad liability protection for amateurs in most contexts, and especially where amateurs volunteer under ARES to provide emergency communications to served agencies.

## **Reference Links**

*American Red Cross*

<http://www.redcross.org>

*ARRL — Served Agencies and MOUs (SOUs)*

<http://www.arrl.org/served-agencies-and-partners>

*Federal Emergency Management Partner*  
[www.fema.gov](http://www.fema.gov)

*Military Auxiliary Radio Service (Air Force)*  
<https://afmars-msn.org/>

*Military Auxiliary Radio Service (Army)*  
<http://www.usarmymars.org>

*The Salvation Army*  
[www.salvationarmy.org](http://www.salvationarmy.org)

*SKYWARN*  
[www.skywarn.org](http://www.skywarn.org)

## **Review**

The relationship between Amateur Radio operators and a partner is a critical one. Emergency communications volunteers should maintain a professional attitude at all times and remember that their relationship to the partner is much like that of an employee — without the paycheck. Partner relationships will vary with the partner, region, and the needs and style of local management.

Avoid giving any information to the press until you understand both the partner's and your own emergency communications group's policies on speaking to the press. Most groups will want all information to come from a central official source, such as a public information officer.

When volunteering in a place where you are not known, do not be surprised if your offer is refused. Response organizations often have requirements for training, localized protocols, and skills that cannot be mastered during an actual emergency.

## Section 1: The Framework: How You Fit In

### Topic 3

#### Amateur Radio Emergency Communications Organization and Systems

### Objectives

#### Welcome to Topic 3.

Emergency communications organizations are what make an emergency communications response possible. After reading this material, you will be able to identify the different organizations and systems that make it happen. This unit introduces several of the largest and best-known organizations, and several related emergency communications and public warning systems.

#### Student preparation required:

None.

### Introduction

Imagine a random group of volunteers trying to tackle a full-scale disaster communications emergency, working together for the first time. They do not know each other well and have very different approaches to solving the same problem, and half of them want to be in charge.

This scenario is not too far-fetched. Just ask anyone who has been around emergency communications for a while — they have seen it! This course is intended to help solve that problem.

Emergency communications organizations provide training and a forum to share ideas and develop workable solutions to problems in advance of a real disaster. This way, when the time comes to assist the partners, you will be as prepared as you can be. The response will occur more smoothly, challenges will be dealt with productively, and the partners' needs met.

Some of the organizations discussed here do not directly involve Amateur Radio operators but knowing about them and how they might assist in an emergency may be helpful. Your partners may utilize or interact with one or more of these systems or organizations.

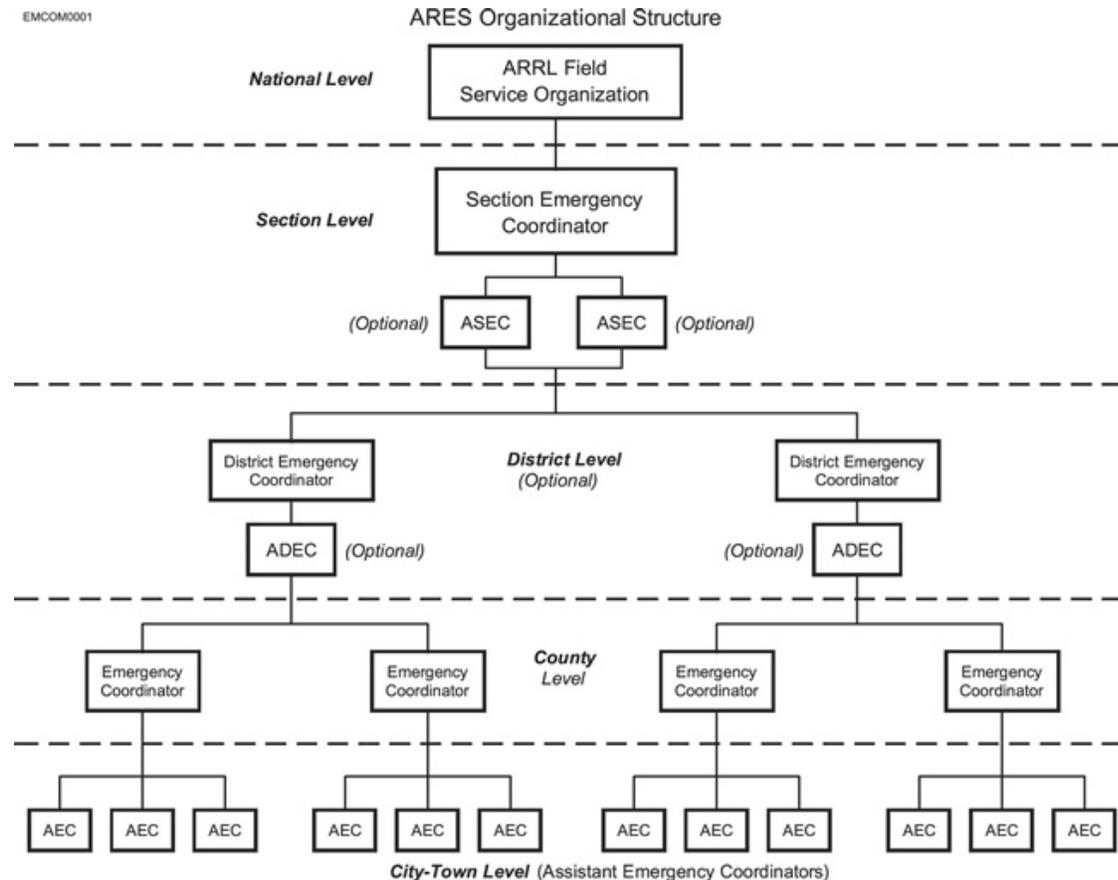
# Amateur Radio Emergency Service® (ARES®)



Among the largest and oldest emergency communications groups is ARES, a program sponsored by American Radio Relay League (ARRL) since 1935. ARES is part of ARRL's field organization, which is composed of Sections. Most Sections are entire states, but some larger and more populous states have two or more Sections.

The elected Section Manager (SM) appoints the ARES leadership. The top ARES leader in each Section is the Section Emergency Coordinator (SEC).

Some larger Sections, like Wisconsin and Michigan, or heavily populated Sections, like Connecticut, are further divided into two or more Districts. In this case, each District is guided by a District Emergency Coordinator (DEC) and Assistant DEC working directly under the SEC and/or an Assistant SEC.



The next subdivision within ARES is the County or similar region, assigned to an Emergency Coordinator (EC). Most ECs will have one or more Assistant Emergency Coordinator (AEC), who may have responsibility for specific tasks or cities. A large city with complex needs may have its own EC, but most towns and smaller cities will have an AEC.

ARES has Memoranda of Understanding (MOU) with a variety of partner agencies at the national level, including the Federal Emergency Management Partner (FEMA), American Red Cross (ARC), Salvation Army, and the National Weather Service (NWS). These documents set out the general relationship between ARES and the partner at the national level and provide guidance for local units of both organizations to draft more specific local MOUs.

In addition to local chapters of national groups, ARES groups often have MOUs or other written or oral agreements with state and city emergency management departments, hospitals, schools, police and fire departments, public works agencies, and others.

## **Radio Amateur Civil Emergency Service (RACES)**



After World War II, it became evident that the international situation was destined to be tense and the need for some civil-defense measures became apparent. Successive government agencies designated to head up such a program called on amateur representatives to participate.

In the discussions that followed, amateurs were interested in getting two points across: first, that Amateur Radio had a potential for and capability of playing a major role in this program; and second, that our participation should be in our own name, as an Amateur Radio Service, even if and after war should break out. These principles were included in the planning by the formulation of regulations creating a new branch of the Amateur Service, the Radio Amateur Civil Emergency Service (RACES).

Recognition of the role of Amateur Radio as a public service came with responsibility. Every amateur should have access to a current version of the FCC rules and regulations for Amateur radio (Part 97), which includes the Amateur Service, the Amateur-Satellite Service, and the Radio Amateur Civil Emergency Service. RACES could be the only part of Amateur Radio allowed to operate if the President invokes the “war powers” granted him by the Communications Act of 1934. *“Upon proclamation by the President that there exists war or a threat of war, or a state of public peril or disaster or other national emergency, or in order to preserve the neutrality of the United States, the President, if he deems it necessary in the interest*

*of national security or defense, may suspend or amend, for such time as he may see fit, the rules and regulations applicable to any or all stations or devices capable of emitting electromagnetic radiations within the jurisdiction of the United States as prescribed by the Commission, and may cause the closing of any station for radio communication... .”*

## **What RACES Is**

The FCC rules define RACES as “*A radio service using amateur stations for civil defense communications during periods of local, regional, or national civil emergencies.*” For this discussion, we’ll use the terms “civil defense,” “emergency preparedness,” and “emergency management” interchangeably.

RACES is a radio service available to government emergency management organizations at all times, for official government emergency communications as specified in 47 CFR 97.407 and 97.111(a)(4). There is no specific declaration or emergency event that activates RACES. The “activation” is the direction of the emergency management official to properly qualified individuals to engage in the permitted types of communications in the Radio Amateur Civil Emergency Service. Except for two specific cases, any communications that could be conducted under the RACES rules can also be conducted under the Amateur Service (non-RACES) rules. Those two exceptions are: communications with US government radio stations for RACES communications, and communications in RACES when the Amateur Service has been ordered off the air by the President’s war emerge powers under Title 47 of the United States Code, Section 606 (47 U.S.C. 606).

To understand what RACES is and what it isn’t, it may help to look at some of the other definitions in the FCC rules, § 97.3(a):

*(1) Amateur operator. A person named in an amateur operator/primary license station grant on the ULS consolidated licensee database to be the control operator of an amateur station.*

*(2) Amateur radio services. The amateur service, the amateur-satellite service and the radio amateur civil emergency service.*

*(4) Amateur service. A radiocommunication service for the purpose of self-training, intercommunication, and technical investigations carried out by amateurs, that is, duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.*

*(5) Amateur station. A station in an amateur radio service consisting of the apparatus necessary for carrying on radiocommunications.*

*(38) RACES (radio amateur civil emergency service). A radio service using amateur stations for civil defense communications during periods of local, regional or national civil emergencies.*

So, what is a “radio service?” A radio service is a categorization of users of the radio spectrum that have a common specific radio communication purpose. Examples include the Broadcasting Service, the Aeronautical Mobile Service, the Land Mobile Service, the Maritime Mobile Service, and, of course, the Amateur Service.

The word “Service” in ARES’s name has a different meaning from “Service” in RACES. The meaning of “Service” as used in ARES is consistent with the meaning of public service: actions carried out with the aim of providing a public good. RACES is an FCC-regulated radio service; ARES is an organization of individuals who apply specialized telecommunications skills for a public good.

The Amateur Radio Services comprise the Amateur Service, the Amateur-Satellite Service, and the Radio Amateur Civil Emergency Service. Most amateur activity is conducted in the Amateur Service. A person doesn’t join the Amateur Service; they get a license and operate in that service in accordance with the applicable rules. Similarly, when an amateur communicates via one of the many amateur satellites, they don’t join the Amateur-Satellite Service; they operate in that service according to the applicable rules. When an amateur operates in the Radio Amateur Civil Emergency Service, they don’t join the Radio Amateur Civil Emergency Service; they operate in that service according to the applicable rules. RACES is a radio service with specific operating criteria. It is not an organization. The rules for operating in RACES require the *operator to enroll in* (“join”) the civil defense (“emergency management”) organization for the jurisdiction in which they will serve, and to register their station with that organization. When there was a local or state government civil defense (CD) organization, the communications volunteers of that organization could be expected to utilize various radio services as directed by a civil defense (emergency management) official, in accordance with the rules for each radio service. This included the Local Government Radio Service, the Police Radio Service, the Fire Radio Service, the Emergency Medical Radio Service, etc.; the Disaster Communications Service; and the Radio Amateur Civil Emergency Service. The volunteers didn’t join any of these other radio services; they joined the civil defense organization and operated in the radio service appropriate to the situation.

There is no RACES organization, hence there is no RACES to join. What amateurs “join” is the volunteer program of the emergency management organization; or, as the FCC rules put it, the Amateur Radio operator must be enrolled in the civil defense organization, and the station to be used in RACES must be registered with that organization.

In the Cold War era, citizens voluntarily joined the CD program to provide one of several specific services: air raid wardens, shelter, fire suppression, first aid, auxiliary police, communications, etc. Many amateurs volunteered to help with communications, which included operating in RACES. They reported to the Radio Officer (not “RACES Officer” or “RACES Radio Officer”), who was responsible for all civil defense radio communications, not just RACES. Over time, public interest in the CD program waned, with the RACES part of the program being (in many cases) the last surviving vestige.

Civil defense evolved into emergency management, and the volunteer program evolved into the Community Emergency Response Team (CERT) program. CERT is the reincarnation of CD,

with one major difference: CD volunteers were specialists, whereas CERT volunteers are generalists — every CERT member is trained in all areas of the program. In those jurisdictions where RACES exist as an organization, it carries on as the communications specialty of the civil defense program — sometimes as a government volunteer organization, sometimes as an autonomous or semi-autonomous organization. RACES was never intended to be an organization unto itself — it is the radio component of emergency management, to be used to achieve the mission of the civil defense program.

### **When RACES Is Operational**

An amateur station operates in RACES only when such operations cannot be conducted under the normal Amateur Service rules:

- 1) When it is necessary to communicate between an emergency management agency and federal government stations for official government emergency communications, and
- 2) When it is necessary to communicate for an emergency management agency official government emergency communications while the Amateur service is ordered off the air in accordance with the President's War Emergency Powers.

Anything else done by amateurs who consider themselves RACES “members” is not within the scope of RACES. Participating in the weekly RACES net on the 2-meter repeater is not RACES, since communications in that net are not specifically authorized by the civil defense organization for the area served (97.407(c) and (d)). RACES “members” sharing information by radio in anticipation of being asked to help, or self-deploying (i.e., not at the direction of an emergency management official), are operating in the Amateur Service, not in the Radio Amateur Civil Emergency Service, regardless of their enrollment status with an emergency management organization.

ARES operates in the Amateur Service, where these specific operations are not permitted. ARES members who want to be able to help in these situations, and to help their emergency management agency in other ways, can do so on the same basis as other citizens — by joining the emergency management agency's volunteer program, which in many cases is the Community Emergency Response Team, or CERT. Enrolling in CERT, or whatever the specific emergency management volunteer program is called, satisfies the enrollment clause of FCC rule 97.407(a). The registration clause of that rule is met by providing information about the station — at the minimum, that should be the call sign, station location, and what bands and modes that station can operate. Emergency managers may require other information to register a station as they see fit; for example, information about availability of emergency power for that station. Enrolling the licensed Amateur Radio operator and registering the station is all that the FCC rules require to establish eligibility to operate in RACES; to be authorized to operate in RACES, the operator must be directed by an emergency management official to engage in specific official government emergency communications (97.407(d)) with an authorized station (97.407(c)).

There does not need to be any group or program specifically called RACES for there to be communications in RACES. ARES members can provide communications in the radio service

RACES — if they meet the enrollment and registration requirement of the emergency management organization. It is not enough for ARES to affiliate with the emergency management organization — the individual operators must personally enroll themselves and register their stations. Why is the individual connection required? The answer goes back to one of the basic principles of the Incident Command System (ICS) — Unity of Command — which says that anyone working under ICS has one, and only one, boss. If you are working for the emergency management organization you can't also be taking orders at the same time from the ARES Emergency Coordinator, the Section Emergency Coordinator, and the Section Manager. The emergency management organization has to know what resources are available to it — it can't be in a position in which it has to compete for a pool of volunteers who are available one minute but committed to some other agency the next. The level of commitment expected by an emergency management organization is a matter to be worked out between that organization and the volunteers.

ARES leadership positions include the Emergency Coordinator (EC), the District Emergency Coordinator (DEC), and the Section Emergency Coordinator (SEC). These positions are all “Coordinators,” not “Managers.” The served agency emergency manager and the ARES Emergency Coordinator should establish a clear understanding of the EC's role in the activation and utilization of ARES volunteers. ARES volunteers should expect to have the same relationship with the served agency as other volunteer groups.

Suppose an ARES Emergency Coordinator says to the Emergency Manager, “I have a roster of my ARES volunteers and I know what their capabilities are. If you need emergency communications, you call me and I'll assign my ARES volunteers. I'm not going to give you my roster, but we want to be your RACES capability.” If the emergency manager does call, can these volunteers operate in RACES? No, because the operators are not enrolled in the government agency's civil defense (emergency management) program, nor have they registered their equipment; nor is the emergency management organization specifically authorizing the communications to be transmitted in RACES, since the EC has imposed himself or herself between the emergency management organization and the volunteers.

Let's assume that a CERT program is the civil defense (emergency management) program for a jurisdiction, so joining CERT meets the enrollment requirement for an Amateur Radio operator to be eligible to operate in RACES. A typical CERT training program has 30 hours of instruction — about the same length of time as for an Amateur Radio licensing class. ARES members who become members of CERT get access to a group of dedicated citizens willing to invest 30 hours of their time to be able to help their fellow citizens — exactly the kind of people who get Amateur Radio licenses and join ARES. It is hard to imagine a better ARES recruitment opportunity than CERT, and it is hard to imagine a better recruitment opportunity for CERT than ARES. If ARES members expect CERT volunteers to invest 30 hours to get an Amateur Radio license, isn't it fair to expect ARES members to invest 30 hours to be certified in the CERT program?

RACES is operational only when it needs to be (to communicate with federal government stations, or when the Amateur Service has been ordered off the air) and when the emergency

management official has directed participating stations to engage in official government emergency communications.

## **ARES and RACES**

RACES was never intended to be an organization unto itself. RACES is not an autonomous entity affiliated with an emergency management agency. It is a capability available to emergency management officials to utilize their volunteers who have Amateur Radio licenses to engage in official government emergency communications. With the understanding that RACES is a radio service, not an organization, it is clear that the one-hour-per-week and 72-hours-twice-per-year RACES exercise rules (97.407(d)(4)) do not apply to amateur activities, which are otherwise permitted under non-RACES part 97 rules. If the emergency management official directs that an exercise be conducted in the Radio Amateur Civil Emergency Service, then the RACES rules including the exercise restrictions apply; but if amateurs (ARES or others) are merely participating in an exercise that involves the emergency management agency, then they are operating in the Amateur Service and the RACES exercise restrictions do not apply.

Consider that several amateurs are enrolled in an emergency management program, so they can communicate in RACES when requested by an emergency management organization. If these amateurs, who might call themselves RACES members, operate in the ARRL's annual Simulated Emergency Test (SET), does 97.407(d)(4) apply? No, because their participation in the SET is not done under the authority of a RACES rule, as evidenced by the fact that many ARES members who are not enrolled in a civil defense program can engage in the exact same communications under their license authority in the Amateur Service. Amateurs do not lose operating privileges as a result of enrolling in a civil defense program and registering their station.

It also becomes clear that the restrictions on with which RACES stations may communicate (FCC rule 97.407(c)) apply only to RACES operation when the Amateur Service is ordered off the air, since these restrictions do not apply to the Amateur Service or the Amateur-Satellite Service. If the Amateur Service is not off the air, an amateur operator may communicate with non-RACES amateurs in the Amateur Service during the same operating period in which they communicate in the RACES.

For example, at the direction of emergency management, an amateur operating in RACES communicates by radio with a neighboring town's emergency operations center. After completing that communication, a non-RACES amateur calls to ask about traffic directions. Can the RACES amateur communicate with the non-RACES amateur? It depends — not on the FCC rules, but on the RACES amateur's instructions from the emergency management official to whom they have volunteered. If the emergency management official said that while on duty the volunteer is to use the radio only for official government emergency communications, then the volunteer must do what they agreed to do; otherwise they might be dismissed from the emergency management program. That is a matter of their agreement as a volunteer, not an FCC rule. If the emergency management official allows such communications but is not directing that it be done as official emergency government communications, then the amateur may

communicate in the Amateur Service (not the Radio Amateur Civil Emergency Service) any unofficial communications. There is no need to “switch hats” — there is no announcement that needs to be made when switching between the RACES and the Amateur Service. ARES communications are conducted in the Amateur Service, RACES communications are conducted in the Radio Amateur Civil Emergency Service; both services share the same frequencies. There is no “when RACES is activated” — either amateurs are operating in the Radio Amateur Civil Emergency Service because they are communicating official government emergency communications with a federal government radio station, which is not permitted in the Amateur Service, or because the Amateur Service and the Amateur-Satellite Service have been ordered off the air; otherwise they are operating in the Amateur Service or Amateur-Satellite Service. If you are not allowed to do something in one service but you are allowed to do it in the other service, then you must be operating in the service where it is allowed. Many amateurs believe that “in an emergency, anything goes.” This is not true. There are specific rules that specify what a station may do in certain emergency circumstances, not whatever someone might consider to be an emergency. These rules are 97.403, Safety of life and protection of property, and 97.405, Station in distress.

***§97.403 Safety of life and protection of property.***

*No provision of these rules prevents the use by an amateur station of any means of radio communication at its disposal to provide essential communication needs in connection with the immediate safety of human life and immediate protection of property when normal communication systems are not available.*

***§97.405 Station in distress.***

*(a) No provision of these rules prevents the use by an amateur station in distress of any means at its disposal to attract attention, make known its condition and location, and obtain assistance.*

*(b) No provision of these rules prevents the use by a station, in the exceptional circumstances described in paragraph (a) of this section, of any means of radio communications at its disposal to assist a station in distress.*

“Immediate safety of human life and immediate protection of property” means actually happening or about to happen, not just the mere possibility that something could happen; “when normal communication systems are not available” — inaccessible or inoperative; “any means of radio communication at its disposal to provide essential communication needs” — essential communication needs directly related to the “immediate” situation, not routine communications that happen to occur during an emergency situation. A station in distress or assisting a station in distress may use “any means at its disposal to attract attention, make known its condition and location, and obtain assistance.” If you think about the meaning of the key terms in these rules, you will see that it is a long way from “anything goes.”

## **Salvation Army Team Emergency Radio Network (SATERN)**



SATERN members are also Salvation Army volunteers. Their HF networks are used for both logistical communication between various Salvation Army offices and for health and welfare messages. At the local level, ARES and other groups often help support the Salvation Army's operations.

### **The Rapid Response Team (RRT)**

In the first minutes of an emergency, it is sometimes important to get the basic essentials of a network on the air quickly. The solution is the RRT concept, although its name may vary. In Hawaii, it is known as a "Quick Response Team" (QRT), and in New Hampshire, a "Rapid Emergency Deployment Team" (RED Team). Rather than a standalone organization, an RRT is small team within a larger emergency communications group. Its job is to put a few strategically placed stations on the air within the first half-hour to hour. These stations will usually include the emergency operations center (EOC), a resource net, and often, a few field teams where they are needed most. This is commonly known as a Level 1 RRT response.

A Level 2 RRT response follows within a few hours, bringing additional resources and operators. Level 1 teams have preassigned jobs, and short-term (12- to 24-hour) go kits (sometimes called "jump kits"), ready to go whenever the call comes. Level 2 teams have longer term (72-hour) go kits, and a variety of other equipment, possibly including tents, portable repeaters, extended food and water supplies, sleeping gear, spare radios, and generators, depending on local needs.

### **ARES Mutual Assistance Team (ARESMAAT)**

When a communication emergency lasts longer than a day or two, or when the scale of the emergency is beyond the ability of a local ARES group to handle, help can be requested from neighboring areas. The ARESMAAT concept was created to meet that need. These teams consist of ham radio operators who are willing and able to travel to another area for a period to assist ARES groups based in the disaster area. They may also bring additional resources in the form of radios, antennas, and other critical equipment. If you travel to another area as part of an ARESMAAT, remember that the local group is still in charge — you are there to do what they need done. In a sense, the host ARES group becomes a "partner."

## **Military Auxiliary Radio System (MARS)**



The Military Auxiliary Radio System (MARS) is a Department of Defense-sponsored program, established as separately managed and operated programs by the Air Force and Army. The MARS program is 91 years young, activated in November 1925 as a partnership between Army's Signal Corps and the licensed amateur radio operators of the ARRL. The program consists of roughly 23,000 licensed Amateur Radio operators who volunteer their time, services, and communications expertise — using their personal radio equipment — to assist the Department of Defense and other federal, state, and local agencies with auxiliary communications in the event of a disaster or emergency.

As an organized military auxiliary, MARS members are prepared to supplement the uniformed services or any designated civilian authorities by provision of specialized autonomous services when called upon or when situations warrant. Through training, exercises, situational awareness, and incident reporting, MARS members help the nation prepare for and respond to crises and emergencies. During times of emergency, MARS provides backup communication networks to military, federal, state, and local agencies. MARS' most publicly visible mission, providing phone patches to family members for US military personnel overseas, has diminished with the advent of new satellites that provide e-mail and phone service almost anywhere. However, this was never MARS' largest or most important function. One advantage of the MARS system is that it is specifically authorized to communicate with other government radio services in time of emergency, including the federal SHARES HF networks.

### **Local Radio Clubs**

Not every area has a working ARES program or other nationally affiliated emergency communications group. In many cases, the void is filled by local radio clubs that work with partner agencies, either informally or with a formal MOU.

### **SHARES**

Even those who have been involved with emergency communications for years may not know of the US government's "Shared Resources System," known as SHARES. The **SH**Ared **RE**Sources (SHARES) High Frequency (HF) Radio Program coordinates a voluntary network of government, industry, and disaster response agency HF radio stations used for emergency communications. SHARES support government (federal, state, and county), critical infrastructure, and nationwide or multi-state disaster response organizations in two ways: by

transmitting emergency messages when normal communications systems are destroyed or unavailable, and by providing HF radio channels for interoperability. SHARES support Emergency Support Function Two (ESF #2), Communications, and helps participants maintain awareness of applicable regulatory, procedural, and technical issues. SHARES is a program of the [National Coordinating Center for Communications](#) (NCC), a division of the Department of Homeland Security (DHS), [National Cybersecurity and Communications Integration Center](#) (NCCIC). In addition to government agencies, key communications companies such as AT&T and agencies such as the Red Cross have SHARES radios. The SHARES system utilizes a number of nationwide and regional networks.

## **Federal Emergency Management Agency — FEMA National Radio System (FNARS)**

This is a FEMA high frequency (HF) radio network designed to provide a minimum essential emergency communication capability among federal agencies, state, local commonwealth, and territorial governments in times of national, natural, and civil emergencies. FEMA monitors FNARS on HF on a daily basis. At the state level, FNARS radios are typically located at the state's emergency operations center (EOC).

## **Radio Emergency Associated Communications Teams (REACT)**

REACT is another national emergency communications group, the members of which include Citizen's Band (CB) radio operators, ham radio operators, and others. In addition to CB and Amateur Radio, they may use General Mobile Radio Service (GMRS), Family Radio Service (FRS), and the Multiple Use Radio Service (MURS).

REACT has an organizational structure similar to ARRL/ARES, with local teams who directly serve many of the same agencies served by ARES and other ham radio emergency communications groups. REACT has MOUs with many of these agencies as well as with ARRL.

REACT's mission is somewhat broader than that of ARES. It offers crowd and traffic control, logistics, public education, and other services that usually (but not always) include a need for radio communication.

## **Emergency Warning Systems**

### **Emergency Alert System — EAS (Broadcast Radio & TV)**

The current EAS system has evolved from the earlier Emergency Broadcast System (EBS) and the original "CONELRAD System" developed during World War II. The EAS relies on radio and TV broadcast stations to relay emergency alert messages from federal, state, and local authorities. Messages may pertain to any immediate threat to public safety, including enemy attack, storm warnings, earthquake alerts, and wildfires. Messages are relayed from station to station using automatic switching systems and digital signaling. You may have heard the

required weekly EAS tests performed by radio and TV stations and their distinctive digital “squawk” sound.

### **NOAA Weather Alert and National Weather Radio (NWR)**

The National Weather Service (NWS) division of the National Oceanic and Atmospheric Administration (NOAA) operates NWR. NWR uses seven frequencies in the 162MHz band to carry audio broadcasts to the public. In addition to routine weather reports, it carries forecast and warning information from the regional network of forecasting offices, and it provides timely and quality alerts dealing with weather and other natural events.

Newer “weather alert” radios are available from a variety of manufacturers with the digital Specific Area Message Encoding (SAME) alert mechanism. SAME-equipped radios will remain silent until an alert is received for a specific geographic area. The user programs one or more five-digit Federal Information Processing Standard (FIPS) codes for the areas they wish to monitor. When the NWS broadcasts the alert with the SAME code matching the one programmed into the receiver, the receiver will activate and allow you to hear the audio message concerning the alert. Some receivers also provide a textual display of the alert information. The NWS tests the SAME network at least once weekly, and the radio will indicate that it has heard the test alert within the past week.

### **NAWAS (National Warning System)**

The federal government maintains a “hardened” and secure national wire line phone network connecting the “warning points” in each state (usually the state police HQ or state EOC). The center of NAWAS operations is the National Warning Center at NORAD’s Cheyenne Mountain command and control complex in Colorado. Its primary purpose is to provide notification in case of enemy attack, and to inform and coordinate alert and warning information among states in a given region. During peacetime, it carries alerts on a variety of wide-ranging emergencies. Roll call check-ins are taken periodically during the day to ensure that the phone circuits are functioning properly.

### **Statewide Warning Systems**

These systems are similar to NAWAS, but at a state level. For most states that have such a system, county warning points are part of a statewide alert and warning network. It is known by different names in each state. For example, in California, it is CALWAS. In Hawaii, HAWAS connects the warning points in each island county, the Pacific Tsunami Warning Center, the local National Weather Service Forecast Office, and the Hawaii Air National Guard. It keeps these key entities informed on a real-time basis of bulletins crucial to these agencies. The warning systems in other states are similar.

### **Tsunami Warning System**

A national and international network of warning points are connected together to provide timely exchange of tsunami warning information. In the United States, it is known as the Tsunami

Warning System (TWS). Information is relayed to a wide range of government, civil defense, military, and international tsunami research/warning points within each country or area.

### **National Earthquake Information Center (NEIC)**

The US Geological Survey operates the National Earthquake Information Center, located in Golden, Colorado. The NEIC issues rapid reports for those earthquakes that register at least 4.5 on the Richter scale in the United States, or 6.5 on the Richter scale (or are known to have caused damage) anywhere else in the world. Public warning reports are disseminated in the affected areas via the NWR and EAS systems.

### **Reference Links**

*Amateur Radio Emergency Service*

<http://www.arrl.org/ares>

*Air Force MARS*

<https://afmars-msn.org/>

*Army MARS*

<http://www.usarmymars.org/>

*Department of Homeland Security SHARES*

<https://www.dhs.gov/shares>

*Emergency Alert System (EAS)*

<http://www.fcc.gov/pshs/services/eas/>

*FEMA National Radio System*

[www.fema.gov](http://www.fema.gov)

*Hawaii EAS*

<http://dod.hawaii.gov/hiema/get-ready/>

*National Earthquake Information Center*

<https://earthquake.usgs.gov/contactus/golden/neic.php>

*National Weather Radio*

<http://www.weather.gov/nwr/>

*REACT International*

[www.reactintl.org](http://www.reactintl.org)

*SATERN*

<http://www.satern.org/>

## **Review**

Organization is critical to any emergency response. Without an organization that plans and prepares in advance, an Amateur Radio emergency communications response is likely to be disorganized and ineffective.

A variety of government and private emergency communication groups assist in time of disaster.

While Amateur Radio operators may not interact with many of these systems, it may help to know that they exist, since your partners may utilize or interact with one or more.

## Section 1: The Framework: How You Fit In

### Topic 4a

#### Partner Agencies and Organizations Communications Systems

### Objectives

#### Welcome to Topic 4a.

Emergency communications volunteers may be asked to use the partner agency's own communication systems. This topic will familiarize you with some of the systems you are likely to encounter.

#### Student Preparation required:

Be familiar with the Continuous Tone Coded Squelch System (CTCSS), also known by various common trademarks, including Private Line (PL) and Channel Guard. (Private Line is a trademark of Motorola, Inc., and Channel Guard is a trademark of General Electric/Erickson.)

### Introduction

Most partner agencies will have their own communications systems and equipment, ranging from modest to complex. In our ever-broadening role as emergency communicators, we may be asked to operate some of this equipment. If this occurs, you must become familiar with its operation. Your emergency communications group should work with the partners well in advance to determine whether the partner will need you to use its equipment, and under what conditions. Many of these radio systems are quite different from ham radio, and special training may be required. In addition to different equipment, on-air procedures will differ considerably. Training and drills may be necessary to make Amateur Radio emergency communications operators proficient.

### State and Local Government Radio Systems

These systems include those licensed to police, fire, sheriffs, highway, and other state, county, or city departments. If you are asked to use any of these systems, be sure to learn their standard operating procedures and phonetic alphabet system (if one is used), and adapt accordingly.

Some departments may use familiar ITU phonetics, some will use APCO phonetics, and still others will make them up as they go along. A few departments still use a “10 code” or something similar, but most are moving away from special codes in favor of plain language. Be careful not to lapse into a ham radio operating style. Casual conversations are prohibited by FCC rules and are usually not permitted by the partner. All transmissions must be directly related to the partner’s mission.



You should be familiar with the established interoperability channels for public safety communications. Interoperability channels for police and fire exist in the VHF low band between 39.46 MHz and 45.88 MHz, and in the VHF high band between 151.1375 MHz and 159.4725 MHz, both near Amateur Radio bands. There are also interoperability channels in the UHF bands. More information on interoperability channels and public safety communications can be found in the National Interoperability Field Operations Guide (NIFOG), available through the Department of Homeland Security (DHS) Office of Emergency Communications.

## Medical Radio Systems

In order to standardize emergency medical radio systems across the country, the FCC has assigned a number of dedicated frequencies. In theory, every ambulance in the country should be equipped to use all these frequencies. In practice, true compatibility is usually limited to a specific region.

The older system, often called “Med Star,” used 10 simplex VHF frequencies with a dial-type pulsed-tone encoder to signal specific hospitals. This system is still in use in some rural areas, but it is quickly being replaced by systems that are more modern. The newer Emergency Medical Radio Service uses 10 UHF duplex frequency pairs — one assigned to the hospital, the other to the ambulance and seven VHF simplex channels. The UHF channel sequence is designated “Med 1” to “Med 10.”

Other systems, such as ReddiNet, are found on the West Coast.

In some cases, the hospital's radio is located on a nearby mountain or tall tower in order to achieve the required coverage and connected to the emergency department by a radio or telephone link.

It's a good idea to learn what your area hospital uses before any emergency occurs.

## **American Red Cross (ARC)**



ARC has a nationally licensed frequency (47.42 MHz) that can be used by all ARC chapters, and is intended primarily for disaster or emergency operations. This common channel ensures that ARC units responding from various chapters will be able to communicate with each other. Some chapters also use 47.50 MHz. In addition, certain chapters may rent space on commercial systems or license their own VHF or UHF systems for day-to-day operations.

## **Types of Served Agency/Partner Radio Systems**

In larger jurisdictions, each partner will probably have its own radio system completely independent of all other radio users in the same area. This is especially true of large city and state police and fire radio systems. Many agencies have more than one channel, each assigned to a different purpose. For instance, a fire department might have a "dispatch" channel, and one or more "fireground" channels. This allows local operations at a fire scene to be kept separate from ongoing dispatch operations. A police department may have a separate channel for detectives, or one for each precinct. These systems may be on repeaters or use simplex frequencies.

The FCC allocates specific radio frequencies to different types of agencies, and some for multi-partner use. For instance, a frequency designated for use by police agencies may only be used for police business. The same is true of fire radio allocations. "Local Government" allocations may be used for any legitimate local government function.

In addition to "simple" systems in which each user group has its own frequency, there are two different types of systems that allow multiple user groups to share resources. These are known as "community repeater systems" and "trunked repeater systems".

### **Community Repeater Systems**

Unlike Amateur Radio repeater systems, a "community" or "shared" repeater uses a different CTCSS tone for each of several user groups. For instance, a city might have one repeater shared by the water, public works, and sanitation departments, licensed as a single "local government"

radio system. Because each department uses a different CTCSS tone, they will not normally hear one another's conversations, but only one department can use the system at any given moment. Some very small rural towns may even combine fire and police department operations on the same system, on either a repeater or simplex frequency.

When using any shared frequency — repeater or simplex — it is important to press the “monitor” button for a moment before transmitting. This disables the CTCSS decoder, temporarily allowing you to hear any transmissions being made on the frequency. Some mobile radios automatically switch to “monitor” mode when the mic is removed from its hang-up clip. In this way, you can be certain that no one else is using the channel before you make your call.

In an emergency situation, these shared channel systems can quickly become overloaded. A common practice is to end all non-essential communications or perhaps move them to an amateur system instead.

### **Trunked Repeater Systems**

Trunked systems provide an efficient means for several “low volume” users to share a single radio system. They use several co-located repeaters tied together, using computer control to automatically switch a call to an available repeater. When one radio in a group is switched to a new frequency, all the others in the group automatically follow. This is accomplished by having a computer controller move the conversation from frequency to frequency in accordance with a pre-established algorithm. The number of available frequencies in the system depends on its design and the number of different user groups. Channel switching and assignment data are transmitted on a dedicated channel. Unlike a shared single-frequency repeater system using multiple CTCSS tones, a trunked system will provide almost instant on-demand clear channels in normal usage. Amateur Radio does not currently use this type of system.

In emergency situations, however, most trunked systems suffer from a lack of reserve capacity. To keep designs cost-effective, there are always many more user groups than available channels. The number of available channels is designed to handle the normal day-to-day communications load. When an emergency occurs, these systems can be quickly overloaded with calls, and finding a clear channel can be difficult or impossible.

One “solution” to this problem is to assign certain users or user groups “priority” over others. If all the available channels are occupied, a higher priority user will bump the lowest priority user off the system and take over the channel. Priority status can either be full-time or turned on in an emergency, depending on the system's design.

### **APCO Project 25 Radio Systems**

In the 1990s, a new public safety radio system was developed to deal with problems of interoperability between agencies with different radios. The Association of Public Safety Communications Officials (APCO) created the Project 25 working group, which created what has become known as the Project 25 (P25) Standard.

P25 radios are extremely flexible, with both forward and backward compatibility. This means that they can be configured to operate in both analog and digital modes, and as part of trunked and conventional radio systems. P25 radio systems are becoming more common across the country as federal funds become available.

The advantages of P25 systems are obvious. Radios from several manufacturers can be programmed to communicate with each other seamlessly, as can radios from different agencies and jurisdictions. Digital modes can offer excellent audio quality under the right conditions, and optional encrypted modes offer message and data security. The disadvantages are less obvious. While P25 digital systems work well in urban environments, they are not as effective in rural or mountainous areas. Some agencies have resisted the use of digital modes because of higher signal-to-noise-ratio requirements. While analog signals can fade in and out, digital signals are either there or they're not, just like a digital cellular telephone signal. Further, the lengthy development time of P25 has led to the deployment of numerous proprietary solutions by commercial manufacturers, a result that works against true interoperability.

## **Telephone Systems**

Telephone systems in use by public service agencies vary greatly. The partners should be able to provide training in their use. Most telephone systems come with user manuals, and if possible, a copy should be included in your group's training materials.

Most business telephone systems allow the following basic functions, with which you should be familiar:

- Answering incoming calls
- Placing outside calls
- Placing and answering intercom calls
- Making "speed dial" calls
- Overhead paging
- Placing calls on hold, and then retrieving them
- Transferring calls to another extension
- Transferring calls to voice mail, if available
- Retrieving calls from a voice mailbox

There may be other, more advanced functions available, but in most cases, you will not need to learn them for temporary operations. However, it is always a good idea to keep the user's manual nearby. You should also try to determine the extent to which the partner's telephone system is dependent on or susceptible to fluctuations in commercial power.

## **Satellite Telephones**

Satellite phones and data terminals are becoming more common among served agencies as the cost of ownership and airtime decreases. Satellite telephone/data service is offered by a number

of companies, including Inmarsat, Iridium, and Globalstar. Some of the services cover much of the Earth's surface, others only certain regions.

Some phones or terminals require that an antenna be pointed directly at the satellite, others do not, but all require line-of-sight to the satellite. Some are handheld; others are contained in briefcases and must be set up before operating. In addition to voice communication, some companies offer paging, fax, and data transmission, albeit at speeds slower than a typical land-based dialup connection. A few phones also integrate a terrestrial cellular phone in the same unit.

Calls are typically expensive, as compared to cellular telephone calls. All calls made through these systems are considered to be "international" calls, and each company has one or more "country codes." If you need to use one of these phones, keep conversations short and to the point. While most of the phones are fairly simple to use, due to the wide variety of phones and services, it is essential that users be fully trained in their use.

In addition, there is some concern that the number of satellite telephones sold far outstrips the number of satellite channels available, so system overload remains a real possibility in a widespread incident.

## **Satellite Data Systems**

Satellite systems in use by public service agencies also vary greatly. Some are used for two-way data and voice communication, others for one-way reception of voice, data, or video. One popular system is the NOAA Emergency Management Weather Information System (EMWINS), which allows emergency management officials to obtain up-to-the-second weather maps and information. If you were trained on the system years ago, you will need to be retrained, as it has changed and upgraded. As with many other partners' systems, the partner will need to provide prior training in their use if they want you to be able to operate this equipment in a crisis.

## **Other Partner-Owned Equipment**

In addition to radio and telephone systems, you may need to use fax machines, copiers, computers, and similar devices. Because many of us use these items every day at work, learning their operation should not be a problem in most cases. However, some copiers and computer programs are quite complicated and may require instruction in their use. Computer software used in public safety applications is usually specially written for the purpose and may require extensive training in the rare situation when you will be required to use the system.

## **Reference Links**

*APCO*

<https://www.apcointl.org/>

*FCC — Public Safety & Homeland Security Radio Service*

[www.fcc.gov/homeland/](http://www.fcc.gov/homeland/)

*FCC Rules — Ham Radio*

<http://www.arrl.org/part-97-amateur-radio>

*National Interoperability Field Operations Guide (NIFOG)*

<https://www.dhs.gov/publication/fog-documents>

*Project 25*

<http://www.project25.org/>

## **Review**

While some partners' systems may be familiar to Amateur Radio operators, others are not. Both equipment and procedures may vary greatly. If a partner expects its emergency communications volunteers to be able to operate any of its systems, specific training should be provided in advance.

## Section 1: The Framework: How You Fit In

### Topic 4b

#### Working Directly with the Public

### Objectives

#### Welcome to Topic 4b.

After reading this topic, you should be able to identify ways to provide direct assistance to your local communities and integrate your skills with existing preparedness efforts.

#### Student Preparation required:

None.

### Introduction

Many radio amateurs want to be of assistance when the need arises, but are unable to commit the time or meet the schedule required for formal participation with a partner or emergency communications organization. These ham radio operators can still make valuable contributions to their communities by getting involved at the local level and making their skills available to their neighbors. Becoming a resource in your community can also enhance the public's understanding of and appreciation for Amateur Radio, and help reduce the potential for conflicts when a ham radio operator wants to erect an antenna on his or her property. The more we are recognized as neighborhood assets, the more likely it is that our antennas, which are essential for effective station performance, will be accepted.

### How You Can Get Started

Neighbors may band together in a variety of ways to help one another. Some have formal associations with a defined leadership structure. Law enforcement agencies often sponsor Neighborhood Watch programs, designed to deter local crime in residential areas. Many areas have implemented Community Emergency Response Team (CERT) programs, which teach basic skills — such as fire suppression, triage, first aid, and light search and rescue — needed to survive when a disaster swamps the resources of official first responders.

Find out what preparedness activities are going on in your area and join one or more local

groups. Learn what plans are already in place and note the communication plan or absence thereof. Let the other participants know that you are a licensed Amateur Radio operator and want to help develop or improve the group's communication resources. Community groups are usually eager to learn from people with knowledge and experience in the areas of concern to them. It's also a good idea to take whatever local training is already offered in disaster preparedness so that your understanding will be at least equal to that of your neighbors and so that you can present your suggestions regarding communications in context with that understanding. Participation in local preparedness courses will also let you meet like-minded individuals with whom you can share ideas. If there is no preparedness group or program in your area, consider starting one using resources available from Federal Emergency Management Agency (FEMA) and other public sources.

## **Using FRS and GMRS Radios**

The most popular and ubiquitous communication tools not dependent on the telephone system or the internet are Family Radio Service (FRS) and General Mobile Radio Service (GMRS) radios. These two services are described in detail in Topic 25. You should be familiar with their use and limitations.

FRS radios may be operated without a license. Transmitting with GMRS radios requires a license. The fee covers a five-year term, and one license covers all the members of a family and as many separate radios as they may need. If you are going to use a GMRS radio, get the license!

Channel numbering can be a source of confusion for FRS and GMRS users because different manufacturers may assign a different number to a given frequency. Sometimes channel numbering will vary even among different models from the same manufacturer. If you are advising a neighborhood group on the use of FRS or GMRS radios, you can suggest one of the following:

1. When equipping a group for the first time, have everyone buy one make and model of radio (or buy the same model in bulk for additional cost savings). Doing this will ensure consistent channel numbering.
2. If different makes and models are already employed by group members, prepare a chart to go with each radio showing the channel number that goes with each frequency.

Every radio owner should be able to power his or her transceiver from standard alkaline batteries. Rechargeable NiCad, NiMH, or Li-Ion batteries are great for everyday use when ac power is available to recharge them, but recharging batteries when the power is out or when heavy use drains the batteries quickly can be a problem. Alkaline cells are inexpensive, can be replaced quickly, have a relatively long shelf life, and are usually kept on hand already for use in flashlights and other devices. If an FRS or GMRS radio needs a separate shell to use these disposable batteries, get one. If the alkaline batteries fit directly into the radio, keep some packed near (not in) the radio, and refresh the supply when necessary.

## Radio Coverage

The limited range of FRS and GMRS radios is both good and bad news. The good news: The distance from which users may receive interference from other users is relatively small. The bad news: There may be parts of a desired coverage area that cannot be reached from a given location. You can suggest or organize a coverage-mapping exercise in which your neighbors test their radios from different locations, indoors and out, to identify any hot spots and dead spots. Find the places you can transmit with the most complete coverage and prepare to use relays for hard-to-reach areas if necessary. Knowing this before a disaster strikes will be most helpful, and it will get people used to using their radios.

## Radio Protocol

During a disaster, time and radio resources may both be in short supply. People will be occupied with caring for their own families or performing their assigned team tasks. It benefits everyone to keep transmissions short and to minimize confusion over who is calling whom. Amateur Radio operators are familiar with good radio protocol and can teach it to their neighbors to promote efficient use of whatever radios are in use. Here are some basic practices to consider:

- Fire, police, and military radio operators make use of tactical call signs, usually associated with a specific function or location, and civilian groups can do the same. First names may be fine for only a few users but can lead to confusion with many users on the same channel. Descriptive tactical call signs such as “Utility One,” “Farmington Command,” or “Elm St. Fire” can reduce confusion in case another team is using the same channel nearby. Your group’s communications plan should include any tactical call signs you decide to use.
- It is good practice to start each transmission by stating the party you’re trying to reach followed by your own call (“Supply, this is Triage”). Wait for an acknowledgement (“Triage, Supply, go ahead”) before sending your message. Keep messages short (“Supply, Triage, we need six blankets at Elm and 1st right away”), and sign off when the exchange is finished (“Triage clear” plus any required call sign) so the other party knows you’re finished and can get back to other responsibilities. Any identification requirement is easily met using this method.
- It is also good practice to use the proword “over” at the end of each transmission to another station. Since most FRS and GMRS is simplex, doubles could occur resulting in lost message content when it’s unclear whose turn it is to transmit.
- Speak — don’t yell — somewhat more slowly and distinctly than you would in face-to-face conversation. Yelling into an FM transceiver usually produces distortion rather than increasing volume — the very opposite of what the user is trying to achieve. Speaking across rather than into the microphone will help reduce the popping of “P”s and the hissing of “S”s, producing clearer speech on the receiving end. Have your group practice with their radios and encourage honest “signal reports” so each user can make the most

effective use of his or her radio.

- Avoid noisy locations when possible. Background noise makes it harder for you to hear and harder for you to be heard.



When people are accustomed to using radios to practice these techniques, they are more likely to find their radios to be useful communication tools rather than distractions from their other duties.

## **Linking to the Outside**

In addition to helping with neighborhood communications plans, Amateurs Radio operators may be called upon or expected to provide a link to adjacent areas or to first responders. You should be aware of the other amateurs in your area who are active in the local emergency communications organizations and know the frequencies on which you can reach them. They will probably be your best access to first responders and aid organizations if there is any access to be had.

You should set realistic expectations as to what you can accomplish. Surrounding areas may be experiencing the same problems you have locally. Fire department and law-enforcement partner communications will be very busy and will give priority to those groups with which they are familiar. You can learn more by getting to know the formal emergency communications organizations in your area. Even if you don't have time to participate with the local emergency communications group regularly, you need to find out where they are likely to be stationed and how you can contact them. For example, if you know which hospitals will have ham radio coverage and the best way to reach them, you may be able to determine whether a given facility is functioning in a disaster so that a seriously injured person can be transported there.

## Community Emergency Response Teams (CERT)



The Community Emergency Response Team (CERT) program educates people about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. Using training learned in the classroom and during exercises, CERT members can assist others in their neighborhood or workplace following an event when professional responders are not immediately available to help. CERT members also are encouraged to support emergency response agencies by taking a more active role in emergency preparedness projects in their community.

IS-317: Introduction to CERTs and the CERT Basic Training Course can be found at <https://training.fema.gov/is/courseoverview.aspx?code=is-317>

“Introduction to Community Emergency Response Teams,” IS-317, is an independent study course that serves as an introduction to CERT for those wanting to complete training or as a refresher for current team members. It has topics that include an Introduction to CERT, Fire Safety, Hazardous Material and Terrorist Incidents, Disaster Medical Operations, and Search and Rescue. It takes between six and eight hours to complete the course. Those who successfully finish it will receive a certificate of completion. IS-317 can be taken by anyone interested in CERT. However, to become a CERT volunteer, one *must complete the classroom training* offered by a local government partner such as the emergency management partner, or fire or police department. If your home area has the program, you can contact your local emergency manager to learn about the local education and training opportunities available to you. Let this person know about your interest in taking CERT training.

### Reference Links

*CERT*

<https://www.fema.gov/community-emergency-response-teams>

*REACT*

<http://www.reactintl.org/>

### Review

The Community Emergency Response Team (CERT) program is a volunteer program of trained people operating in teams under Incident Command System (ICS) protocols. In the role of gathering initial information, radio communication capabilities can be a major asset to CERT and

other community teams. Many local community organizations are using FRS and GMRS radios within neighborhoods and then Amateur Radio to relay information in to formal operations centers.

## **Student Activities**

### **Section 1 (Topics 1-4b)**

NOTE: These activities are for student review only and are not required to be submitted.

#### **Topic 1**

1. List three ways in which emergency communications are *similar* to day-to-day communications.
2. List six ways in which emergency communications *differ* from non-emergency communications.

#### **Topic 2**

1. If you were asked to develop a Statement of Understanding (SOU) between your local emergency communications group and a local partner, what general topics would you include?

#### **Topic 3**

1. Go to the ARRL Web site at [www.arrl.org/ares](http://www.arrl.org/ares) and familiarize yourself with the ARES information provided there especially with the contents of the ARES Manual and the Field Resources manual.
2. Discuss the difference between ARES and RACES with your instructor.
3. When does RACES rules apply?
4. Name two instances when RACES would be operational.

#### **Topic 4a**

1. What do Sections 97.403 and 97.405 of the FCC Rules and Regulations (<http://www.arrl.org/part-97-amateur-radio>) state about amateur communications during emergencies?

#### **Topic 4b**

1. Inquire as to the existence of a CERT or similar team in your area. Contact members and interview them about their role. Who would be the person in your area to contact to learn about local education and training opportunities available with their program?