

Introduction to Radio

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WSCE785 – Whiskey Sierra Charlie Echo 7 8 5 [GMRS]

NSD PTA Council E-Prep Chair, CERT Instructor, numerous FEMA classes.

AGENDA

- What is a radio?
- Why use a radio?
- CERT and radios
 - Commination Types
 - Radio Types
 - How to use
- Emergency Communications – Groups
- Overview of Amateur (HAM) Radio
- How to become an Amateur Radio Operator
- Questions

What is a Radio

- The transmission and reception of electromagnetic waves of radio frequency, especially those carrying sound messages.



- Yes, Cell phones emit radiation in the radio frequency region of the electromagnetic spectrum

Communications in an Emergency or a Disaster



- Cell network overloaded or damaged
- Only 7% of landlines and cellular calls go through in the first few hours



Radio Communication

Communications: **WHY**

- Effective communications is the greatest logistical problem during an emergency event
- CERT Communication
 - Intra-team communication
 - Size-up - maintain situational awareness
 - Essential for Functions
 - Search & Rescue, Crowds
 - Schools: Student Reunification, School Drills, etc...



**Radio Transmissions are not private
Can be heard by the Public and Reporters**

Communications: **WHAT**



Effective communications promotes safety

- Calling for help when needed
 - emergencies and urgent requests
- Reporting safety-related incidents or concerns:
 - Causality Reports and Damage Assessments
- Search and Rescue
 - Intra-team communications
- Status Reports
 - Team leaders keeping track of team members and their needs
- Mutual Aid Requests
- Health and Welfare messages



Communications: **HOW**



There are multiple communication options

Mode	Technology	Plus	Minus
Simple	<ul style="list-style-type: none">▪ Runner	<ul style="list-style-type: none">▪ Reliable▪ Flexible▪ No special training	<ul style="list-style-type: none">▪ Limited distance▪ Slow
Conventional	<ul style="list-style-type: none">▪ Landline▪ Cell Phone▪ Internet	<ul style="list-style-type: none">▪ Familiar▪ Texts may get through congested networks▪ Potential high data rates	<ul style="list-style-type: none">▪ Depends on wires or fiber optics and electricity▪ Likely overwhelmed▪ May be out for days, weeks or even months
Emergency	Two-way Radio <ul style="list-style-type: none">▪ FRS▪ GMRS▪ HAM	<ul style="list-style-type: none">▪ HAM: Extremely reliable▪ Infrastructure not required▪ Long range with repeaters	<ul style="list-style-type: none">▪ May require a license▪ Complex radios▪ Not secure



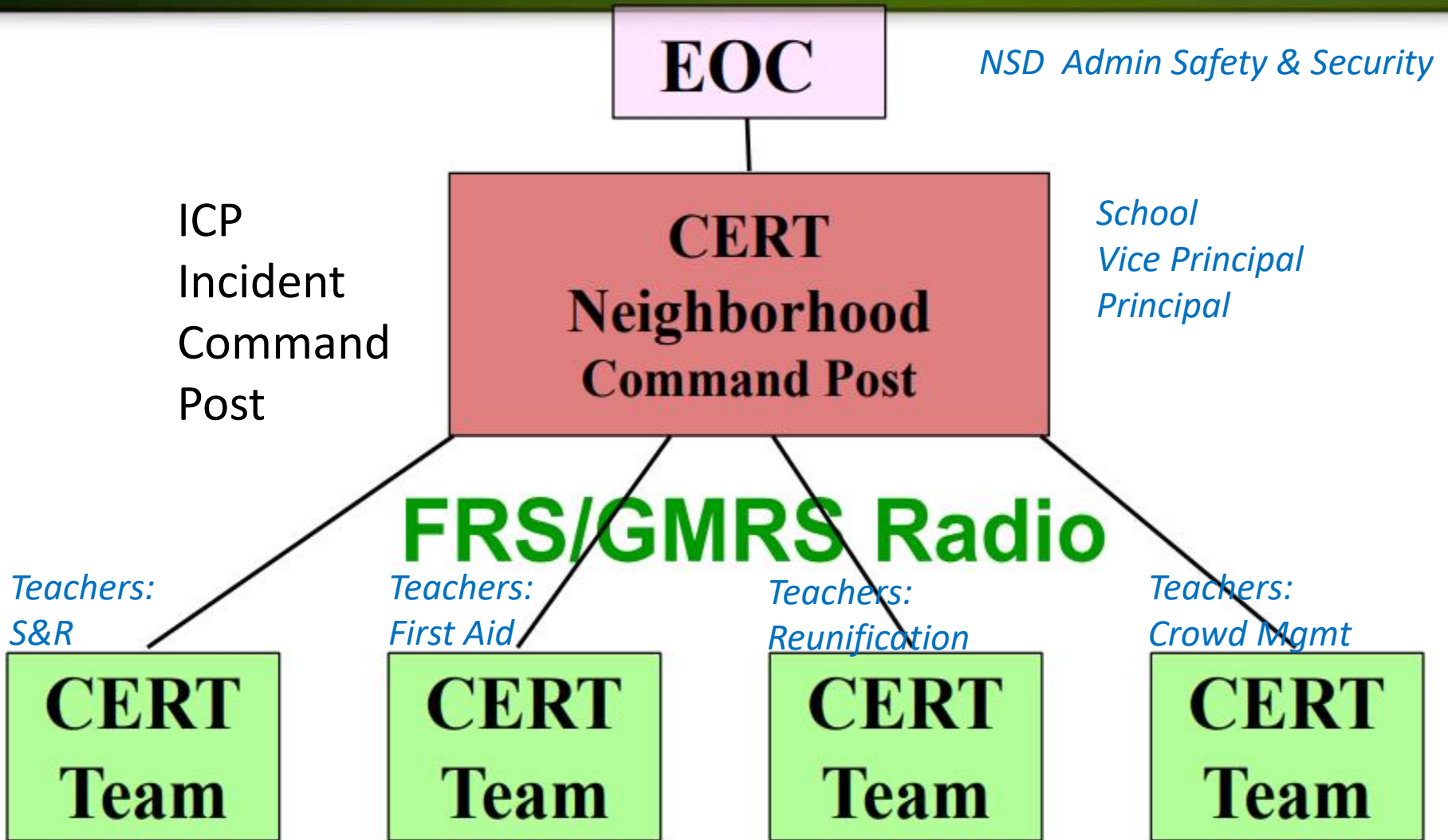
Radio Types

	Family Radio Service (FRS)	General Mobile Radio Service (GMRS)	Amateur Radio Service [HAM]
Channels	22	22	Wide Range *
License Required	No	Yes	Yes
Power (Maximum)	.5 Watts 2 Watts	5 Watts to 50 Watts	1500 Watts
Range	Line of Sight	Line of Sight	The Moon
Antenna	Fixed	Varies	Assorted



Note: * Ham radio has bands across all of the radio spectrum, which provide different characteristics for different purposes

The CERT team's view: Basic Disaster Communications



Communications: **WHO**

- Who makes the decision?
 - **In the field** – individual CERT member or group lead
 - **When** – Emergency, Priority, or Routine
 - **Who** – All messages go to CERT ICP (Incident Command Post) or as designated by the local School EOP (Emergency Operations Plan)
 - **At the CERT ICP** – CERT Team Leader or delegate
 - Who – messages go to Incident ICP, EOC or CERT group (Operations, Plans, or Logistics)
 - **At the EOC** – City emergency manager or delegate
 - NSD Safety & Security EOC would interface with City EOC School Liaison or directly with the emergency manager.

Communications: **WHEN**



Determining message precedence is essential

Precedence: Emergency, interrupt traffic:

- Immediate threat to life,
- Property or the environment

e.g., mass casualty, spreading fire, major infrastructure failure, large hazardous material release

How to use

- **Read the Instructions for the radio**



How to Use

- Hold radio 2” - 3” from mouth
- Talk across the microphone, not into it
- Speak in a normal voice
- Don't raise your voice
- Use clear pronunciation
- If adjacent noises obscure your speech shift your location. Don't talk louder
- Transmit only when necessary
- Use plain English, no codes
- Speak slowly and clearly

Common Words

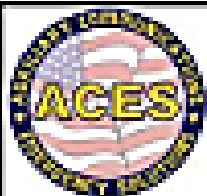
- Affirmative – “Yes” (in answer to a specific question)
- Break – “I have priority traffic.”
- Break-Break – “I have emergency traffic.”
- Clear – “I am finished with this communication.”
- Copy – “I acknowledge receipt of message.”
- Negative – “No”
- Out – see Clear
- Over – end of transmission, waiting for response



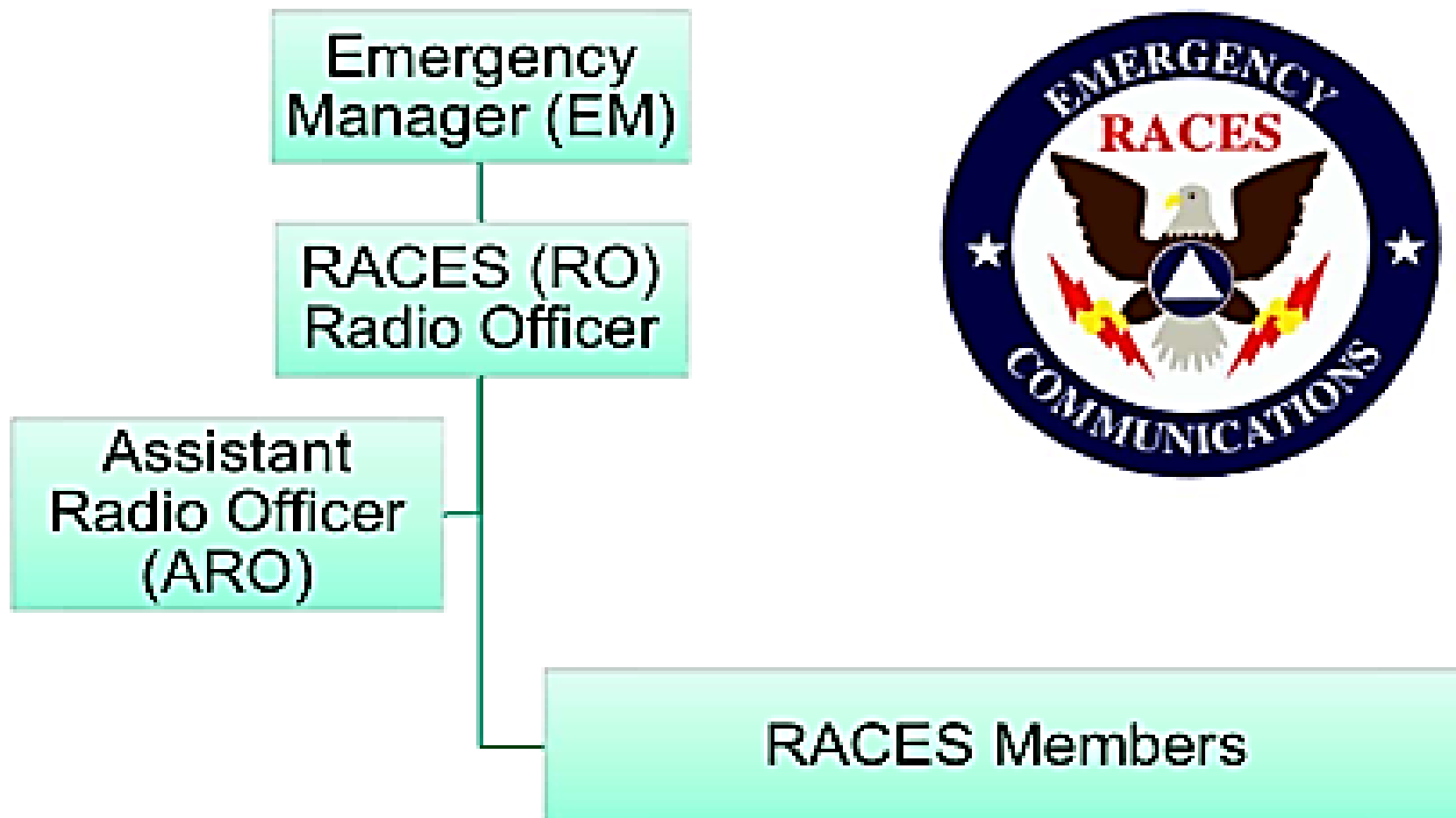
Emergency Communications Groups

- Radio Amateur Civil Emergency Service (RACES)
- Amateur Radio Emergency Service® (ARES®)
- Auxiliary Communications Service (ACS)
- Civil Air Patrol (CAP)
- Military Auxiliary Radio System (MARS)
- Community Emergency Response Team (CERT)

PSERN Project radio provided 800 MHz radios that are appropriate to the needs of fire departments, law enforcement agencies, schools, hospitals, public works agencies across King County

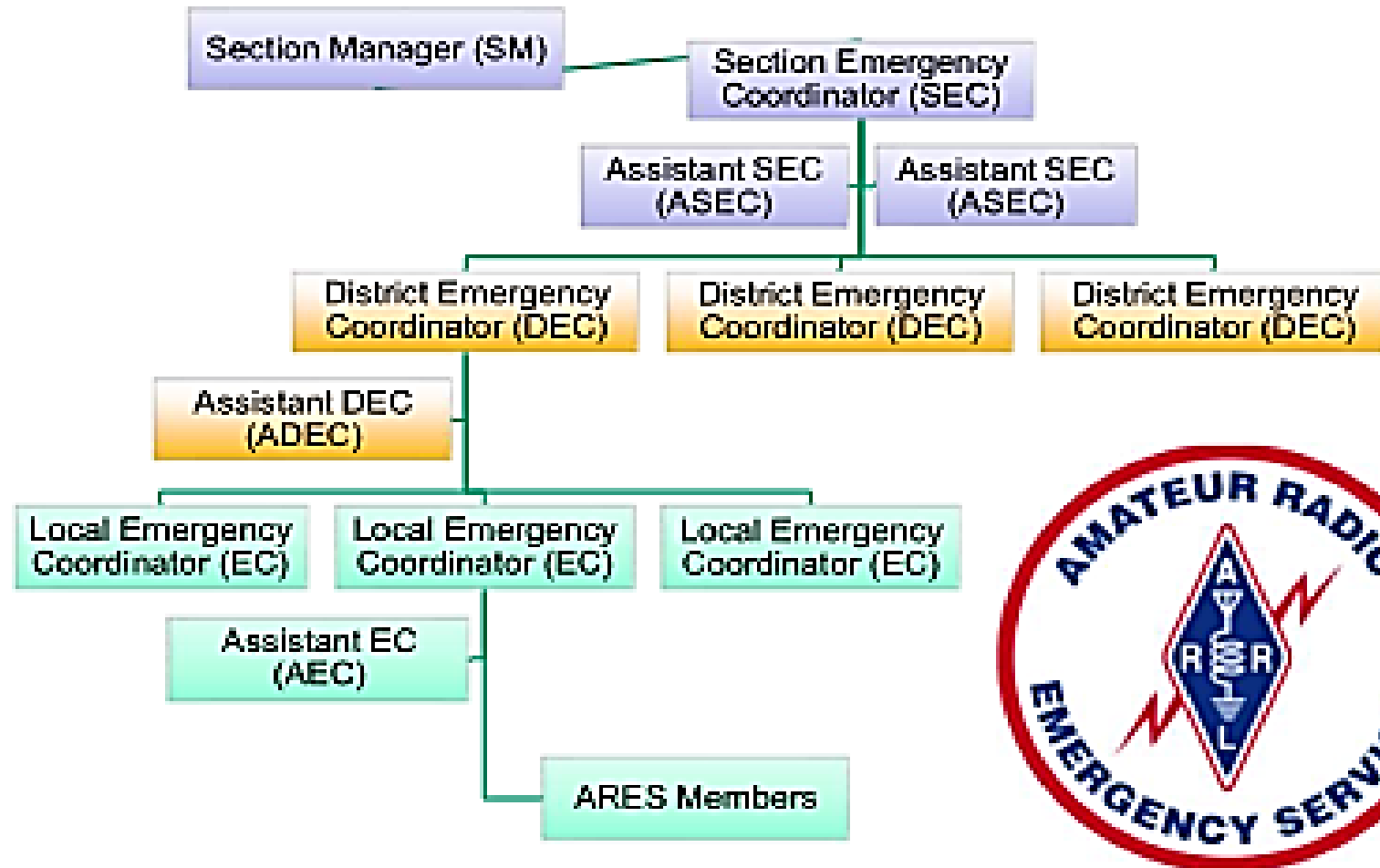


RACES Structure





ARES® Structure



*ARES® and *Amateur Radio Emergency Service® are registered service marks of the American Radio Relay League



Auxiliary Communications Service



- An Organizational Concept:
 - Provides an over arching management structure allowing Emergency Managers to request whatever communications needs they have and get solutions
 - Provides a structure putting ALL communicators together, sharing resources between groups
 - State of California, City of Seattle, many others
 - Department of Homeland Security provides the AUXCOMM course, providing a model of ACS
 - Radio operators are "Auxiliary Communicators" (AUXC) and report to a "Manager" who reports to the incident COMML
 - No national organization or structure to adhere to, design of the concept can be tailored to fit the served agency need

What is Amateur Radio?

Amateur (ham) Radio is a popular hobby and service that brings people, electronics and communication together. People use ham radio to talk across town, around the world, or even into space. It's fun, social, educational, and can be a lifeline during a disaster.



Actor Tim Allen has an Amateur Radio License
[Video Introducing Amateur Radio](#)

[Click on links](#)

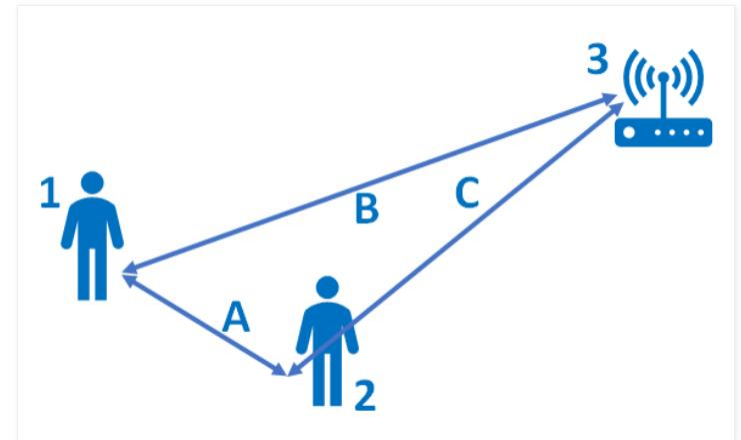
Education...

This knowledge has practical, everyday applications that educators have used to teach science, technology, engineering, and math concepts. Lots of hams got into the hobby as kids and followed their interest in radio to exciting careers as astronauts, engineers, pilots, and more.



Contesting...

...using microphones, Morse code, and even by interfacing a radio with a computer or tablet to send data, text, or images. Some compete in contests, trying to make the most radio contacts

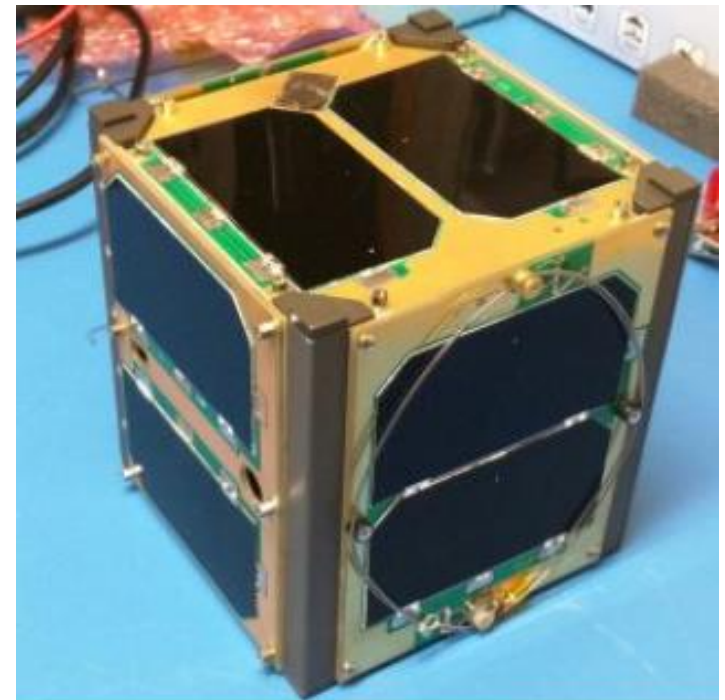


This method of signal location is called triangulation. Radio signals travel at about the speed of light which is about 982 million feet per minute.

Technology...

Amateur Radio has been around for over 100 years, and the technology behind it continues to evolve and advance today.

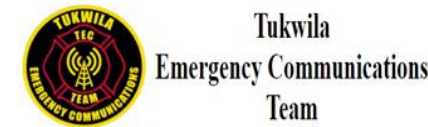
Software defined, digital radios, point to point emails, build your own satellites



Public service...



The Amateur Radio Service is a valued element of neighborhoods and municipalities across the US. In times of disaster, when regular communications channels fail, the Amateur Radio Service works with public service agencies...



click on logos – link to the site

Get licensed...

Although people get involved with Amateur Radio for many reasons, they all pass a test to earn the Federal Communications Commission (FCC) license that shows they have a basic knowledge of the principles of electricity, radio technology, and operating rules.



HOW DO I BECOME A HAM OPERATOR?



You will need to obtain your Federal Communications Commission (FCC) Amateur Radio License Technician Class or higher. This is a very straight-forward and simple process:

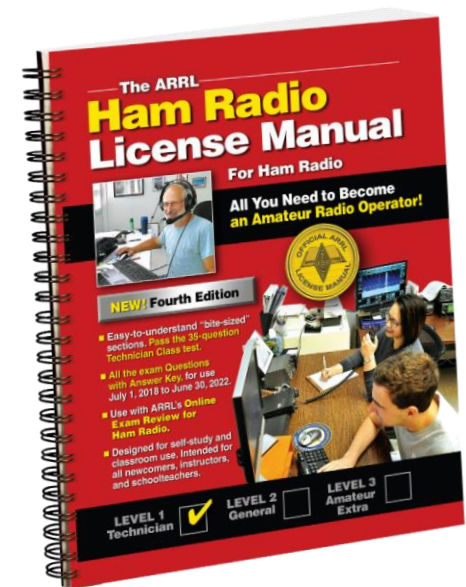
The ARRL (American Radio Relay League) has a number of resources:

- [How to get your Technical License](#)
- [How to become a radio Amateur](#)
- [Find a training class](#)
- [Find an Online exam class](#)

In the local area, check out other training classes:

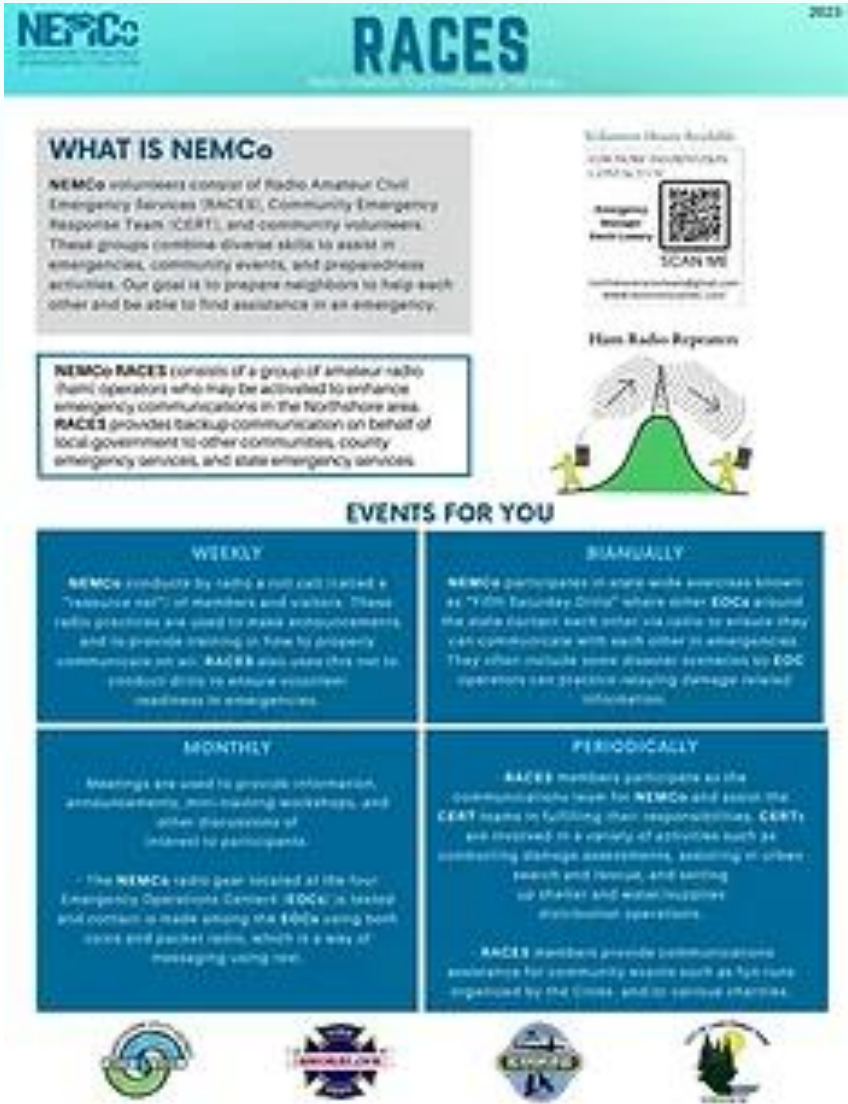
- [Lake Washington HAM Club \(LWHC\) Training Classes](#)
- [Mike and Key Amateur Radio Club](#)

Pass the 35-question Technician Class License test



More Information: www.northshoreemc.com/nemco-races/new-hams

Volunteers



WHAT IS NEMCo
NEMCo volunteers consist of Radio Amateur Civil Emergency Services (RACES), Community Emergency Response Team (CERT), and community volunteers. These groups combine diverse skills to assist in emergencies, community events, and preparedness activities. Our goal is to prepare neighbors to help each other and be able to find assistance in an emergency.

NEMCo RACES consists of a group of amateur radio (ham) operators who may be activated to enhance emergency communications in the Northshore area. RACES provides backup communication on behalf of local government to other communities, county emergency services, and state emergency services.

Events Available
COMMUNITY EMERGENCY SERVICES (CERT)
SCAN ME
www.northshoreemc.com

Ham Radio Preparedness

EVENTS FOR YOU

<p>WEEKLY</p> <p>NEMCo conducts by radio a roll call (called a "rollup net") of members and visitors. These radio sessions are used to make announcements and to provide training in fire for property communicators in all RACES also uses this net to conduct drills to ensure volunteer readiness in emergencies.</p>	<p>BIANNUALLY</p> <p>NEMCo participates in state-wide exercises known as "7th Saturday Drills" where other EOCs around the state contact each other via radio to ensure they can communicate with each other in emergencies. They often include some disaster scenarios so EOC operators can practice relaying damage related information.</p>
<p>MONTHLY</p> <p>Meetings are used to provide information, announcements, non-training workshops, and other discussions of interest to participants.</p> <p>The NEMCo radio team located at the four Emergency Operations Centers (EOCs) is tested and trained to make using the EOCs using both voice and packet radio, which is a way of messaging using text.</p>	<p>PERIODICALLY</p> <p>RACES members participate as the communications team for NEMCo and assist the CERT teams in fulfilling their responsibilities. CERTs are involved in a variety of activities such as conducting damage assessments, securing in-situ search and rescue, and setting up shelter and water/desalination distribution operations.</p> <p>RACES members provide communications assistance for community events such as fun runs organized by the town, and at various charities.</p>

WWW.NorthshoreEMC.com

- NEMCo is CERT + Amateur + General volunteers
- NEMCo is involved in Community Events and public service
- NEMCo has training and exercises
- Become a ham as well as a CERT and join NEMCo.



What is CERT?
CERT is an organization of volunteer emergency workers who have received specific training in basic disaster response skills to supplement existing emergency responders in a major emergency or disaster. They are called their skills to reach family members and neighbors. Residents and visitors to our community may need to rely on each other to help in order to meet their immediate life sustaining needs. With CERT you learn to help your community.

NEMCO CERT TRAINING

Northshore Fire and Emergency Management Agency (NFEMA) provides a regular team throughout the year. Examples of the program include:

- DISASTER PREPAREDNESS:** Necessary skills specific to the community, standardize team training and participation and disaster preparedness, search, and other activities, as well as an overview of CERT and local laws governing volunteers.
- FIRE SUPPRESSION:** Covers fire detection, firebreak materials, fire hazards, and fire suppression strategies, overview of the fire service in the role of the emergency responder, operating activities, and extinguishing a small fire.
- MEDICAL OPERATIONS:** Participants practice triaging and treating injury, stabilization, bandaging, and other first aid using simple triage and first aid treatment techniques.
- LIGHT SEARCH AND RESCUE OPERATIONS:** Participants learn about search and rescue strategies, how to use search techniques, rescue techniques, and rescue safety.
- PSYCHOLOGY:** Covers signs and symptoms that might be experienced by the disaster victim and rescuer, and provides CERT responder and management.

TRIAGE
Medical triage is the way to doing the most good for the most people. Injuries are often severe and there are limited resources. Triage is the process of sorting out the most serious injuries and providing the most effective triaging support available until professional responders arrive on the scene.

Join us! CERT Meets 7pm, the 2nd Tuesday of the month, at Fire Station 51, Kenmore, Washington. Please consult website for most current information.

Click on the Pictures

CERT

Questions



Reference Material



The Phonetic Alphabet

<u>Letter</u>	<u>Phonetic</u>	<u>Letter</u>	<u>Phonetic</u>
A	Alpha	N	November
B	Bravo	O	Oscar
C	Charlie	P	Papa
D	Delta	Q	Quebec
E	Echo	R	Romeo
F	Foxtrot	S	Sierra
G	Golf	T	Tango
H	Hotel	U	Uniform
I	India	V	Victor
J	Juliet	W	Whiskey
K	Kilo	X	X-ray
L	Lima	Y	Yankee
M	Mike	Z	Zulu

FRS - Family Radio Service

Advantages

- Inexpensive
- Widely used
- No license required
- Range up to ~1 to 2 miles
- 22 channels, up to 2 Watts power on 15 channels, 0.5 watts on the rest.
- Best used for intra-team communications



Limitations

- Line of Sight
- Handheld only
- Cannot alter radio to improve

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Transmissions
are not private**

GMRS

Advantages

- License covers all family members
- GMRS channels 1 - 7 are shared with FRS
- External antennas for portable radios
- Can cover large area with a repeater
- 5 watts handheld, 50 watts for non-handheld



Limitations

- Moderate to very high cost
- FCC License required, valid 10 years.
- Handheld limited range 5 to 10 miles



**Radio
Transmissions
are not private**

Amateur Radio (a.k.a. ham radio)

Advantages

- Range more than 100 miles with repeaters
- Does not use public infrastructure
- Good availability
- Moderately priced (\$60.00 and up)
- Handheld, mobile, and base stations
- Emergency Communications



Handheld



Mobile

Limitations

- Requires license, pass an FCC exam
- No business use
- Operators cannot be paid



Base Station

**Radio
Transmissions
are not private**