# Communications and Accountability

Unit 23: Communications and Accountability
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## Communications

- Radio – limited resource, shared locally and globally
- International convention on shared use of radio spectrum
- National laws implementing the international agreements
  - US: FCC – Federal Communications Commission
    - Specific rules for specific Radio Services

For communications in SAR we tend to rely heavily on portable radios.

Seems simple, push the button and start talking...

Lots more than that involved in communicating effectively and professionally.

Radio frequencies are a limited resource, some sorts of radio signals readily travel around the world, so there is an international convention on how to share that limited resource, and national implementations.

In the US, the Federal Communications Commission produces specific rules for different radio services – public safety is one radio service, amateur radio another, broadcast television another, etc.

Chart: United States Department of Commerce, Public Domain
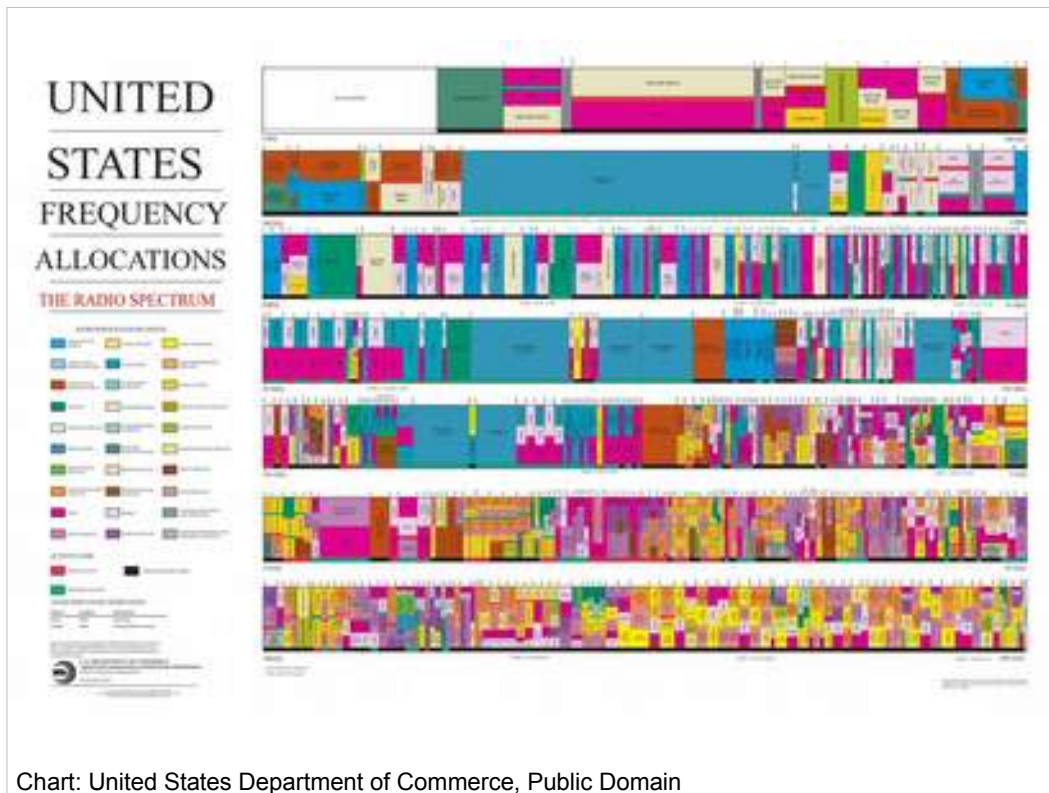
Here is a visualization of radio frequencies are allocated in the US by the FCC.

Very detailed: Lots of complexity.

## Radio Services

- No License required
  - FRS
  - MURS
  - CB
- License required
  - Amateur Radio Service (individuals)
  - Public Safety (public safety agencies)
  - Land Mobile (commercial)
  - GMRS (families)
- [Marine]

Some radio services require a license, some do not. Capabilities of services vary considerably.

Marine radio service is limited to marine use only, land to land communication not permitted (no shore to shore communication).

Licensed operation under the Amateur, Public Safety, and Land Mobile all have more capabilities, including distances covered, that the FRS, MURS, and CB radio services.

- FRS, No License, Small set of shared frequencies, 0.5 watt, FM, UHF.
- GMRS, License per family, Small set of shared frequencies, 7 shared with FRS, 8 repeater pairs, Typically 1-5 watt, up to 50 watt, FM, VHF.
- Citizens Band.  No License.  Small set of shared frequencies, AM, HF.
- MURS, No License, Small set of shared frequencies, 2 watt, FM, UHF
- Public Safety.  License per agency, frequency coordination through coordination body (APCO), one or a few frequencies. May be encrypted, VHF or UHF, 11KHz FM, can be Trunked digital, often repeater pairs.
- Amateur Radio.  Individual license, written tests.  Multiple bands, many frequencies, repeaters, digital networks, location beacons, video, many different capabilities.

Here's some of the capabilities of some of the radio services potentially usable by SAR resources.

## Parts of a Radio

- Antenna
- PTT button
- Battery
- Volume control
- Squelch control
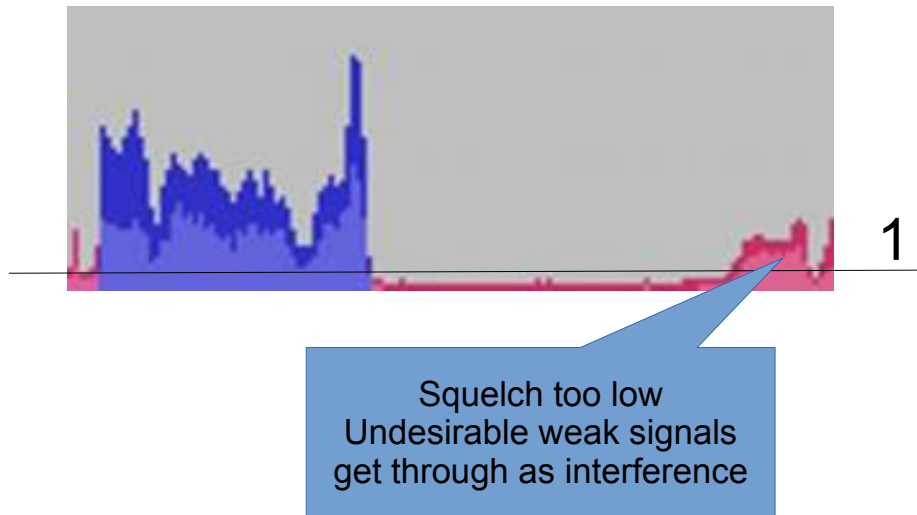- Speaker
- Microphone

FRS Radio: Open Clip Art

Get to know your radios.

PTT button, location of the microphone, battery level, volume, squelch.

Squelch may be hidden behind a menu rather than a physical dial.

# Squelch



Squelch too low
Undesirable weak signals
get through as interference

Squelch control lets you decide how strong a radio signal needs to before the radio will turn it into sound and play it over the speaker.

Turn squelch down to zero and you will hear the background noise of the universe – static, until a signal comes through.

Set a low squelch level, and you will hear weak signals, this may be undesirable, they may be other people at a distance using the same frequency for something else.  Or, it may be desirable, you may need to turn down the squelch to hear a transmission at distance in terrain.

# Squelch



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Squelch too high
Strong local signal
doesn't get through
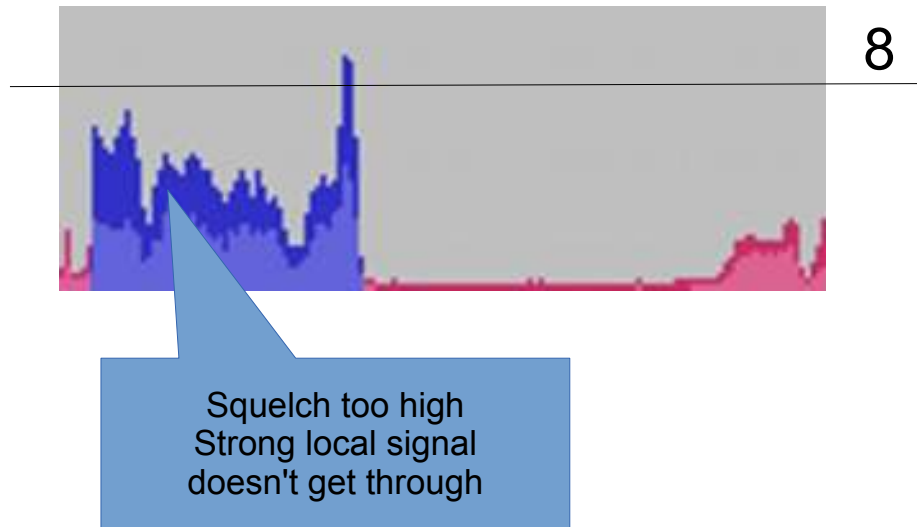
Turn the squelch up too high, and you won't be able to hear most of the  strong local signals you are interested in.

## Squelch: Just Right
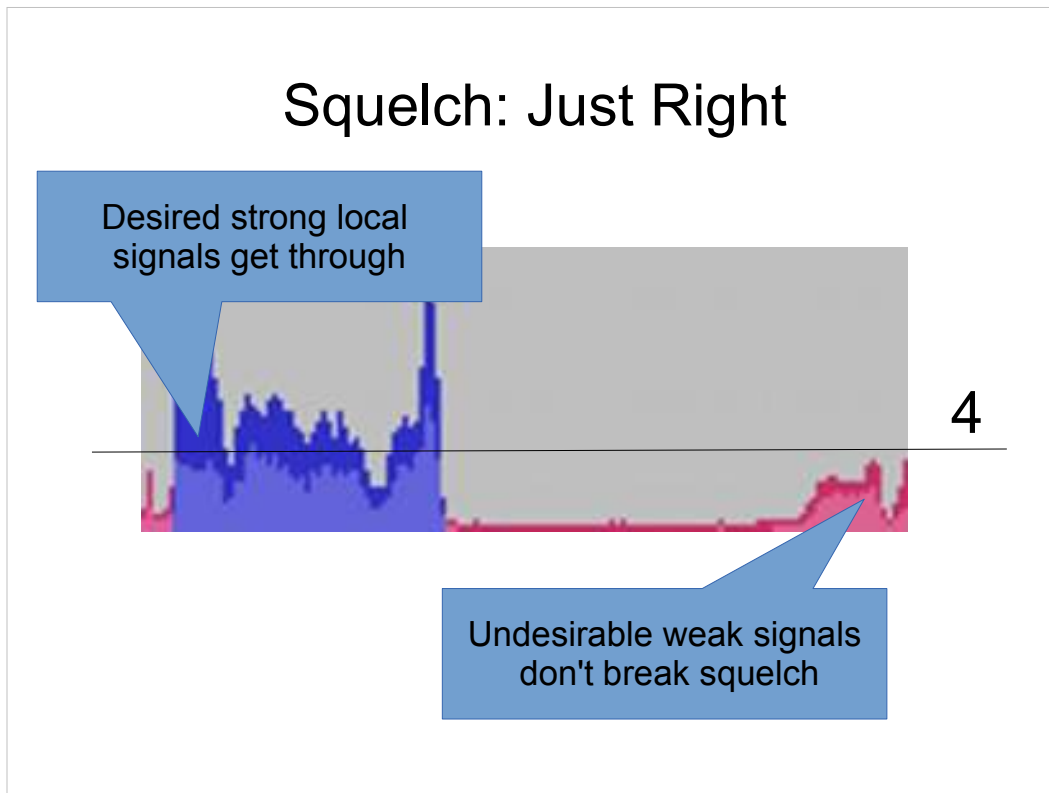


You've got the squelch set right when you can hear the signals you want to hear, but not other weak signals.

In general, you want the squelch set just above the noise background – turn the squelch down until you hear static, then turn it up slightly so that the radio goes quiet.

# PL (CTCSS) Tones

- Continuous Tone-Coded Squelch System
  - Squelch won't open (even for a strong signal) unless it hears a particular tone on the signal.
  - Assist frequency sharing, reduce noise in poorly designed recievers.
  - Doesn't prevent your transmissions from being heard.
    - Someone with CTCS turned off can hear all transmissions.
    - You can only hear the transmissions with the CTCS tone that you are using on them.

PL Tones (nothing to do with privacy): A tool that can help you to reduce the amount of unwanted noise you have to hear.

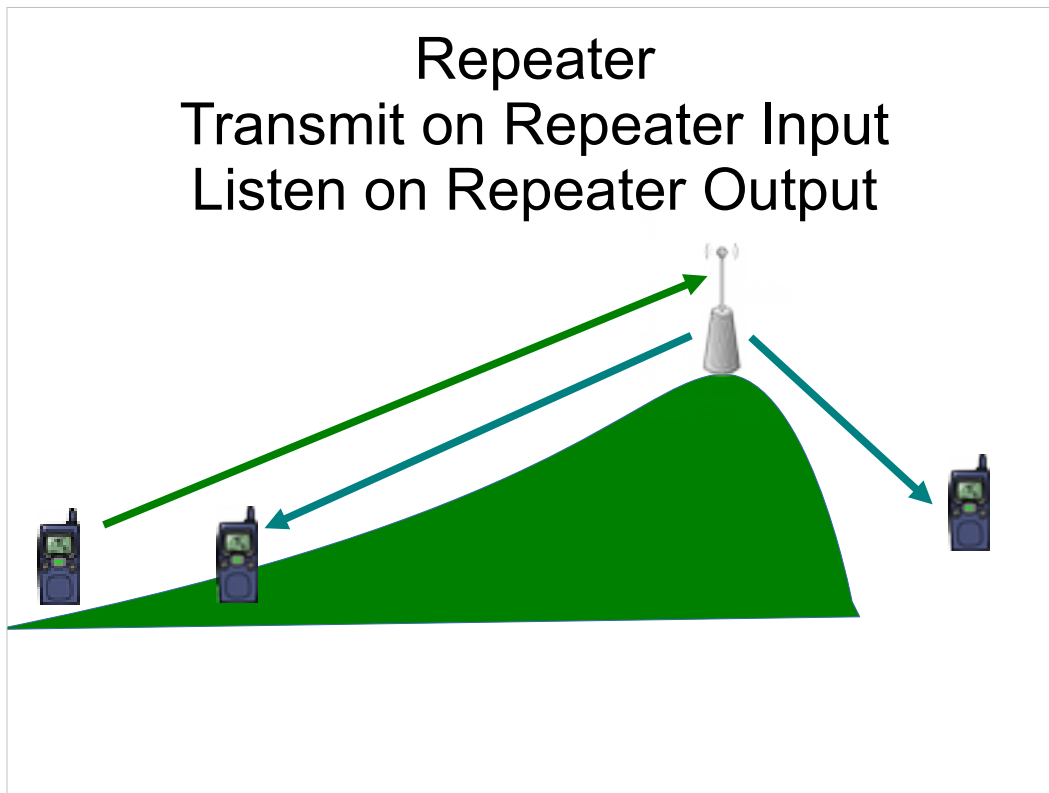## Simplex: Single Frequency Line of Sight
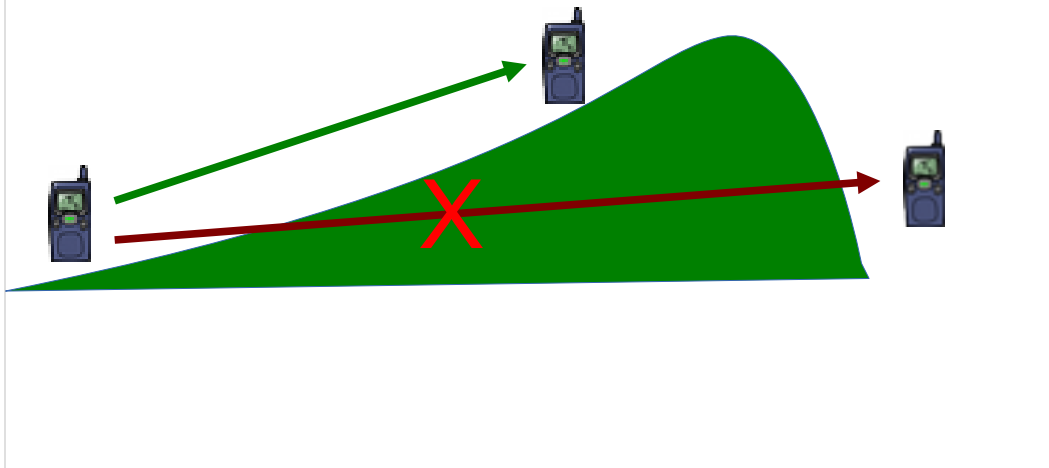
You will often be operating radios on a single frequency (simplex), line of sight.

Terrain gets in the way (hills, gullies, etc.).

Buildings get in the way.

You probably won't be able to talk to another station on the other side of a hill.

Repeater
Transmit on Repeater Input
Listen on Repeater Output

In some services, repeaters can be used, an radios are programmed to use two frequencies at once.

A repeater is placed on a high point (or a tower on a high point).

Radios transmit on one frequency. The repeater listens on this frequency. The repeater re-transmits the signals it receives on a second frequency. All the other radios are listening to this repeater output frequency.

Everyone who the repeater can hear can talk with anyone else who can hear the repeater.

Radio systems can also use multiple linked repeaters.

**Linked Repeaters**
**Transmit on Repeater Input**
**Listen on Repeater Output**
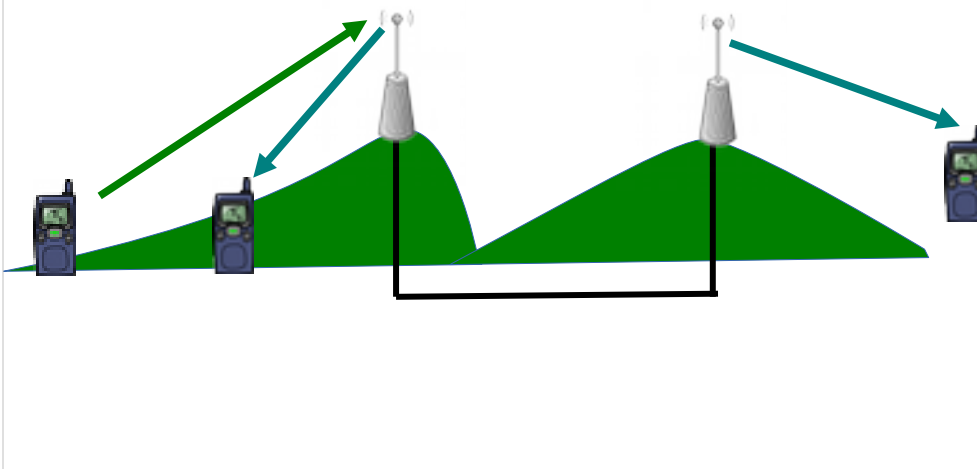
Public safety systems often use linked repeaters – any repeater can pick up a transmission, and all of the linked repeaters will retransmit it.

These systems may also be trunked – and may support complex frequency sharing.

## Troubleshooting Radio Communications

- Some common sorts of issues
  - Low Battery: Radio transmits briefly then drops out. Radio can hear transmissions but won't transmit.
  - Loose speaker/microphone connector: Radio appears to be on but isn't transmitting and/or you can't hear anything.
  - Weak, broken signals: Hold the radio up in the air, antenna vertical. Turn down the squelch. Hold the radio vertical over the top of a car. Move to higher ground

Train as you search.

Use your radios regularly in training.

Under stress, you tend to revert to training.

Understand their capabilities.

Give problems an opportunity to arise, then work them through.

First word or so lost in a transmission?

Probably Operator error, not pausing before talking.

So:

## Using a Radio

- **Plan** what you are going to say.
- Listen to make sure channel is clear.
- Press PPT button.
- Pause.
- State your message.
- Release the PPT button.
- Establish contact then transmit message.
- Use plain English, no codes.

Think out your (brief) message.

Listen (don't step on someone else who is transmitting).

Press Push To Talk (PTT).

Pause.   Then start talking.

First call up the station that you are trying to reach, then when you've established contact, transmit your message.

Plan out what you are going to say to help keep the transmissions short (someone else might have something more important to say than you).

## Establishing Contact

- One Convention:
- Your call **to** the station you are calling:
  - Ground Team 3 **to** Operations

- Another Convention:
- The station you are calling **from** your call:
  - Operations **from** Ground Team 3

Two methods for establishing contact (for initiating communications).

You TO the station you are calling.
**Or**
The station you are calling FROM you.

Within an agency, often one convention adopted and the pro-word left out. "Ladder 2, Control". Common among people who are talking to each other all the time, know each other's voices, etc.

For multi-agency response, use a pro-word (and settle on the convention that emerges in the incident).

Doesn't particularly matter which convention.

## Failure Modes:
## If you start talking before transmitting

- Your call **to** the station you are calling:
  -          m 3 **to** Operations
  - This is Operations, station calling, go ahead.

- The station you are calling **from** your call:
  -          **from** Ground Team 3
  - ????

With one difference between the two conventions:

It is not unusual for the beginning of a transmission to be lost (someone starts talking before pressing down the PTT key, someone keys up a repeater and starts talking before it picks up the signal and starts repeating it).

The typical failure case of the beginning of a transmission being lost is more easily recovered in the me TO you order than in the you FROM me order.

Better: **Avoid the Problem:** Remember to start transmitting, pause, and only then start speaking.

# Call Signs: Who are you calling

- ICS Positions
    - Command: The incident commander
    - Operations: The operations section chief
- ICS Locations
    - Base: A logistic support base
    - Staging: A staging area
- Functional call signs
    - Ground Task Force 5:
    - Ground Strike Team 3:
    - Team Pippa (Single Resource)
    - Control (or Fire Control, or Dispatch: a PSAP center)

In general, don't call people by name over the radio, call their call sign – usually a handle for their functional role in the incident.

## Acknowledge **and** Echo Back

- *task:* Task 4 to Operations
- *ops:* Go ahead Task 4
- *task:* Completed assignment, returning to pickup point.
- *ops:* **Acknowledged, task 4 completed assignment, returning to pickup.**

When someone communicates some message to you do two things:

(1) Acknowledge their message.

(2) Repeat it back to them.

Why?

Take out your notebook and a pen
Turn around
Prepare to copy a location

## 19T 0297385 4710843

Have most of the class turn around and prepare to copy the coordinate.

Have one member of the class read out the coordinate.

Then (click to display the text),

How well did everyone copy the coordinate?

Take out your notebook and a pen.
Turn around.
Prepare to copy a location.



## 19T BH 87446 09591

Repeat with this location, except have one member of the class read out the coordinate while **writing** it down (forcing them to read more slowly).

Discuss.

Was this easier to receive?  Why?

## What To Say

- Radio check when departing staging.
- Call in when starting assignment.
- Welfare check, often every 30 minutes.
- Call in upon completion of assignment.
- Clues, with location (unless directed to call in by cell phone).

- USNG Coordinates in **full**, unless some other practice has been established in the search (e.g. first 4 digits each of easting and northing).

Always call for a radio check before departing staging – make sure that your communications work before you begin an assignment.

Call in when you start on an assignment.

There should be a radio check of all deployed resources in a search, typically every 30 minutes.

Call in when you complete your assignment.

Call in clues, unless you've been directed otherwise.

## Choose Words For Clarity

- Affirmative instead of (Yes, OK, 10-4)
- Negative instead of No
- Obtain instead of Get
- Standby instead of Wait
- Received, Acknowledged instead of (OK, 10-4)
- Niner for 9
- Numbers individually:  12 as "one two" not twelve.

Get into the habit of using words that can be clearly understood over the air.

Avoid the use of codes (that's also an ICS expectation, use plain language for communication).

## How To Say It: Be Professional

- To the point, brief, transmissions
- Speak in a clear normal voice
- Control your emotions
- Remain impersonal: no irritation, sarcasm, disgust, laughter.
- Be courteous (but not "Please", "Thank you")
- No Humor on the Air

People are listening.

They will misinterpret what you say.

Be professional.

## What Not To Say

- Assume all communications are being monitored (by the general public and the news media)
- Use other communication channels (cell phone) to report a find of a deceased person
- No codes, unless you have been briefed on a code to use to communicate sensitive information (such as a find of a deceased subject when cell coverage aren't available).
- You do not want someone to overhear something they shouldn't (the perpetrator may be monitoring search communications).
- Absolutely no swearing the radio

The press is listening.

Friends and family may be listening.

The perpetrator may be listening.

Be professional.

## It Is Unlawful To

- Transmit false distress signals
  - For transmissions in training that could be mistaken for reports of distress, regularly state "This is a Drill"
- Transmit obscene, indecent, or profane language.
- Cause malicious interference.

Certain transmissions are illegal.

These include:

Transmitting False distress signals.   Make sure you always include the phrase "This is a Drill" when making transmissions during training that could be mistaken for a real emergency.

Transmitting Obscene language.

Malicious interference with other radio users.

Not responsible for communications on your assignment? **Turn your radio off.**

- Unnecessary noise.
- You are wasting your battery. 12 hours from now it may be needed!
- Rumor Control: Someone in hearing distance may hear something they shouldn't (e.g. a friend or family member).

On an assignment, give the communication role to one person.  Other people on the assignment don't need their radios on.

## Radio Nets

- Formal Nets Have:
  - A Net Control Station
  - Check In procedure
- Some Types of Net
  - Status (PAR) check
    - Net control calls each station on a list
    - Each station replies briefly with their status.
- Traffic net on more than one frequency
  - Check in and net management on one frequency.
  - Passing of long messages from one station to another is moved to another frequency.

Usual use of tactical frequencies – arbitrary station to station communication.

What happens when things get complex?
Lots of people need to communicate?

Controlled Net – All calls directed to a Net Control station, net control directs stations how and when to pass messages to each other.

On Controlled Nets, net control can direct stations with messages (traffic) for each other to pass that traffic on another frequency, then return to the net.

Common controlled net in SAR: Status/PAR check.

# Personnel Accountability Report (PAR) [Status Check]

- Roll Call

- Is everyone in an incident physically accounted for?

- Initiated by Command (or a net control station) at regular intervals (20 or 30 minutes).

Status check (PAR (Personnel Accountability Report) in the fire service) – roll call of resources – checking that all personnel are accounted for.

- Fire Service: Call sign, PAR, personnel count, location
  - IC: *Command to all stations stand by for a PAR.*
  - IC: *Ground Task 1, PAR*
  - Ground Task 1: *Ground Task 1, PAR 8, segment 3.*
  - IC: *Ground Task 2, PAR*
  - Ground Task 2: *Ground Task 2, PAR 6, segment 5*

- More usual in SAR: call sign, status
  - IC: *Command to all stations stand by for status check.*
  - IC: *Ground Task 1, status check*
  - Ground Task 1: *Ground Task 1, on task*
  - IC: *Ground Task 2, status check*
  - Ground Task 2: *Ground Task 2, on task*

Fire service typically has a stylized form – when called on by net control (or command) each resource replies with its call sign, PAR, number of personnel accounted for, and location.

SAR, typically more relaxed, reply with call sign and brief status "on task".

## Accountability Systems

- Location of all personnel at all times.
- Identity and location of all responders to the incident.
- Use at every incident (including every training).
- Location and assignment (or other status) of all responders at all times.

Communications are partly about command and control, but also heavily about accountability: Knowing where everyone is in a search all the time.

Searches tend to send people off on assignments in a flurry of activity. It is very easy to loose track of who is where.

Always take the time to carefully track who is where doing what.

Make it a habit in training – sign ins, signouts, task assignment forms, status checks.

Train as you search. Make accountability a habit in training so it will be habitual under the pressures of a search.

T-Cards

As we've seen before, t-cards, one form for keeping track of who is where.

What are others?

How do we manage accountability in a SAR incident?

How do we track who is at the incident?

How do we track if everyone has gone home safe?

Discuss.

## Managing Accountability

- Who has been mobilized for the incident.  (sign in)
- Who is out on which task. (SAR task assignment form)
- What is the status of each resource. (T cards)
- Communications to support accountability: (test, on task, regular check-ins, off task).
- Regular status checks – may include location.
- Demobilization: Did everyone get home safe. (demoblization plan and implementation)

In SAR we try to maintain accountability of:

Who has been mobilized to an incident.

Who is where and what they are doing during and incident.

Regularly checking on the status of all resources deployed in the field.

Demobilization and has everyone gone home safe.