ROLLING WITH THE PUNCHES: COMMUNICATING WHEN YOUR PLAN FALLS THROUGH

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Story County ARES

October 3rd, 2019

Overview

- Introducing skills to successfully get your message across when your radio communications plan falls through
- Focus on VHF and UHF commonly used during public service events and communication emergencies

Topics

- Repeaters
- Simplex
- Simplex Repeaters
- Human Relays
- Listening on Reverse
- Cross-band and Locked-band Repeaters
- Increasing Your Signal
- Increasing Just Your Received RF
- Increasing Just Your Transmitted RF
- 12 volt Power From Alternative Sources

Repeaters

- Usually your primary communication plan
- A two-way radio system consisting of at least one transmitter, one receiver, and a controller, which receives a signal on one frequency and re-transmits it on another frequency, at exactly the same time
- Repeaters are typically located in high locations so that they have greater coverage area
- They greatly increase a user's communication range since they can retransmit his/her signal across all of its coverage area

How a Repeater Works

147.24

147.84

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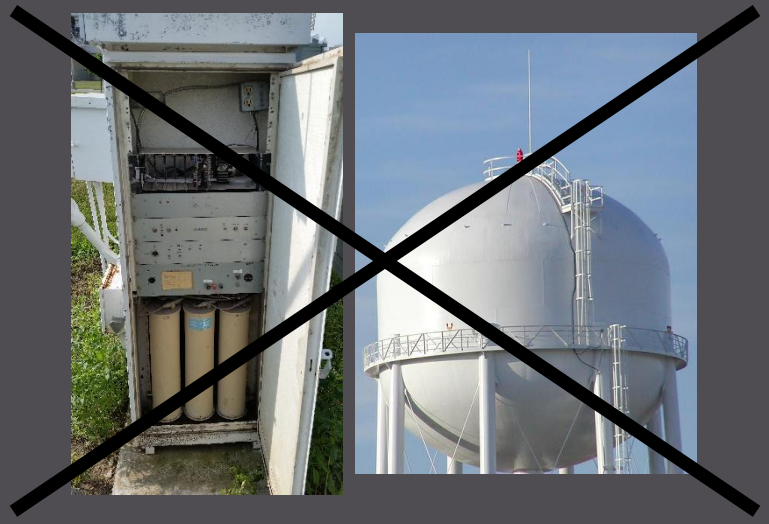
147.24

Simplex



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- Same frequency for Transmit and Receive
- All stations must take turns

Simplex Repeater

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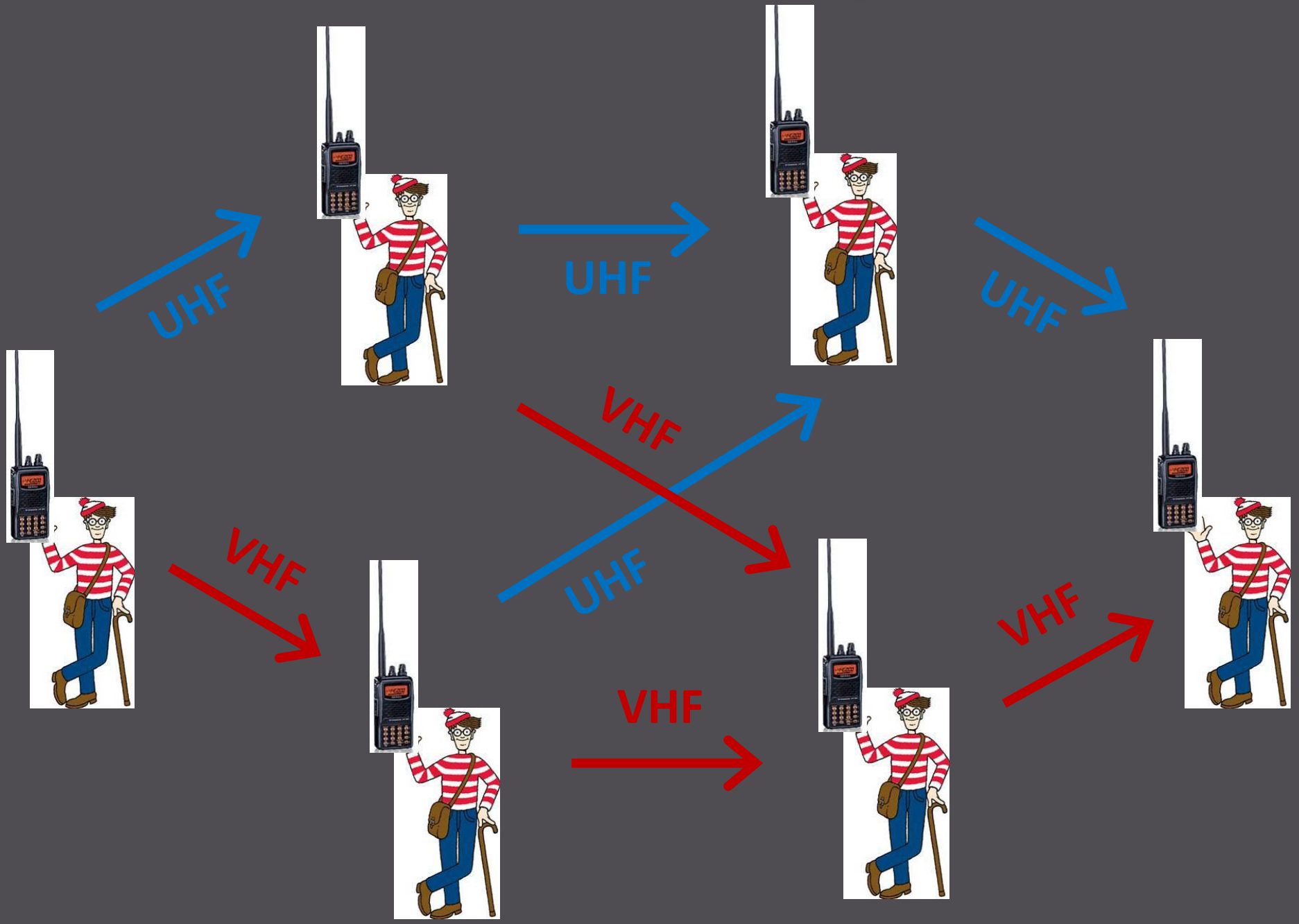
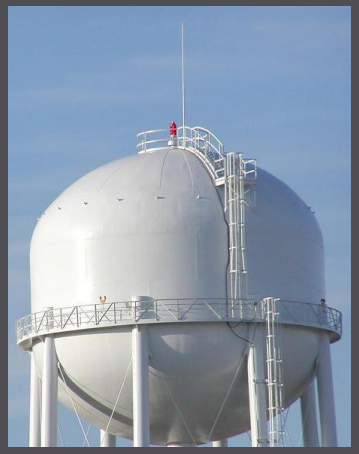
- Repeater records, immediately re-transmits
- Same frequency for Transmit and Receive

Human Relays



Human Relays



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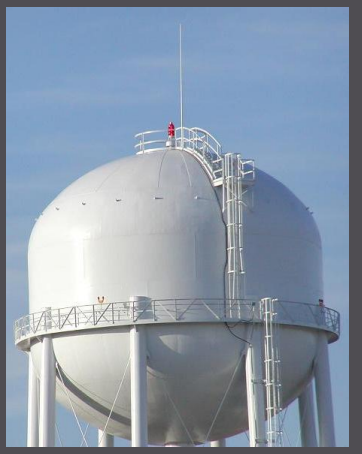
Listening on Reverse



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Cross-Band and Locked-Band Repeaters

- Cross-band
  - Two way A < > B
  - What is heard on A side is re-transmitted on B side
  - What is heard on B side is re-transmitted on A side
- Locked-band
  - One way A > B
  - What is heard on A side is re-transmitted on B side
  - What is heard on B side is NOT re-transmitted on A side

Locked-Band Repeater

Locked-Band Repeater

Cross-Band Repeater

446.5

446.5

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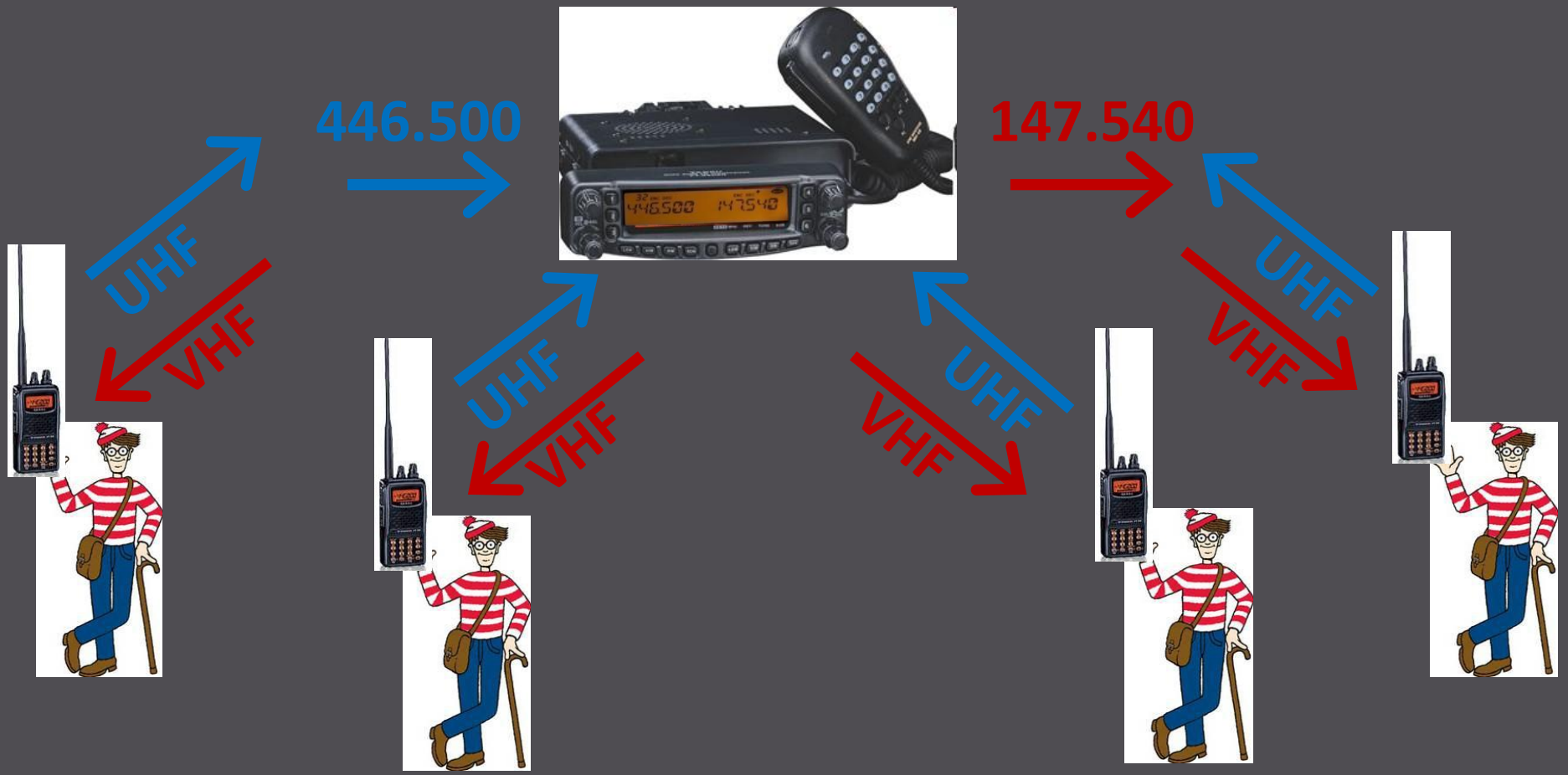
Locked-Band Field Use



2 Locked-Band Radios as VHF Repeater

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446.5

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Cross-Band Repeater Link

448.25

443.25

147.24

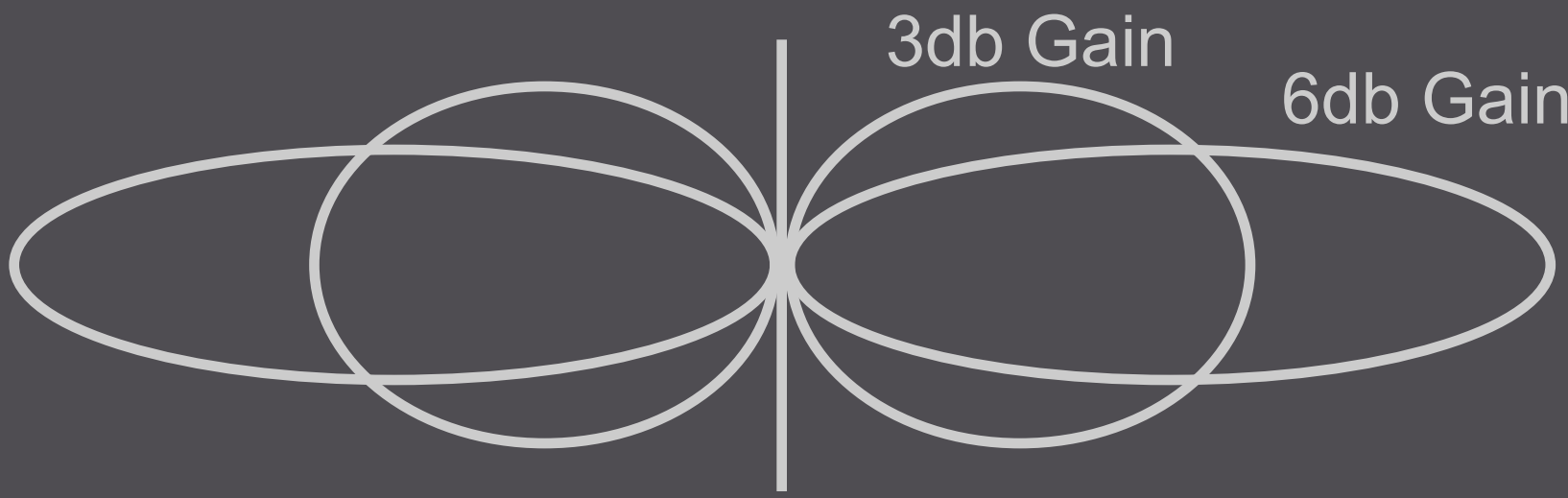
147.84

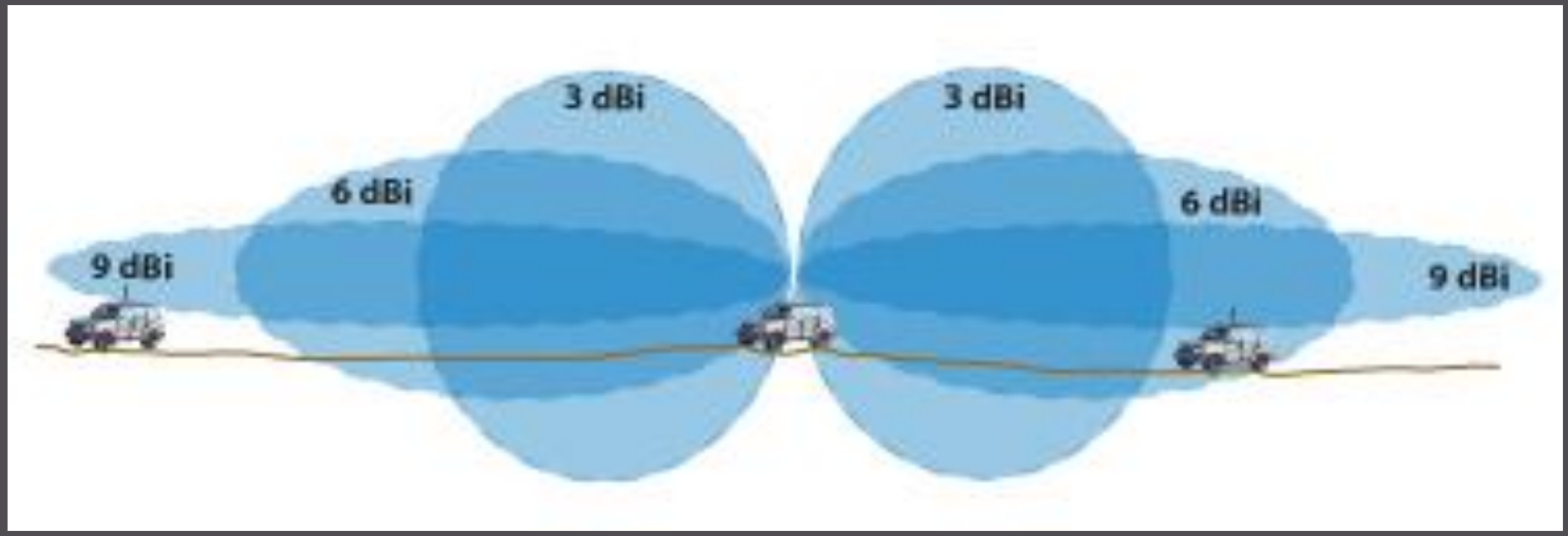
Increasing Your Signal

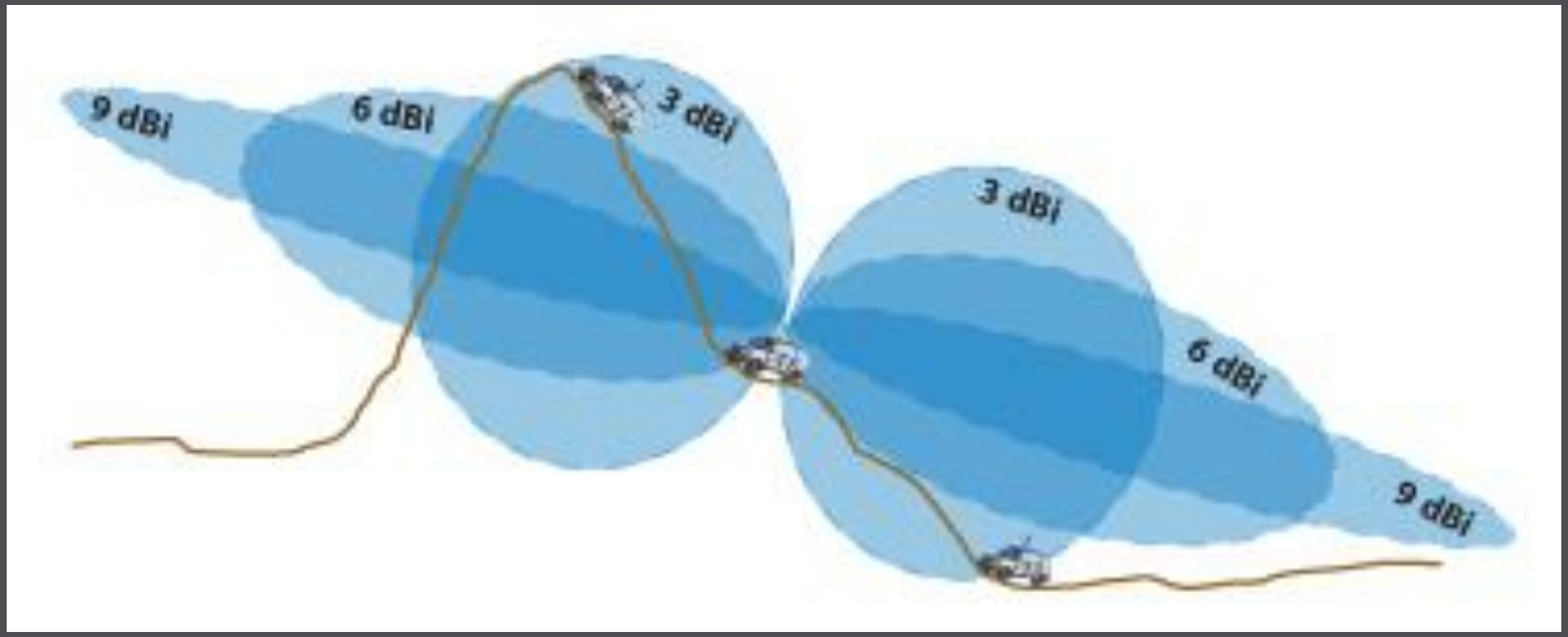
- When you need to increase both transmit and receive power
- Luckily, the gain of any reciprocal antenna when receiving is equal to its gain when transmitting
  - In general, an antenna can be assumed to be a reciprocal device unless otherwise stated

Gain Antennas

- Increasing your antenna gain increases both transmit and receive power in a particular direction
  - Effect depends on antenna properties and pattern

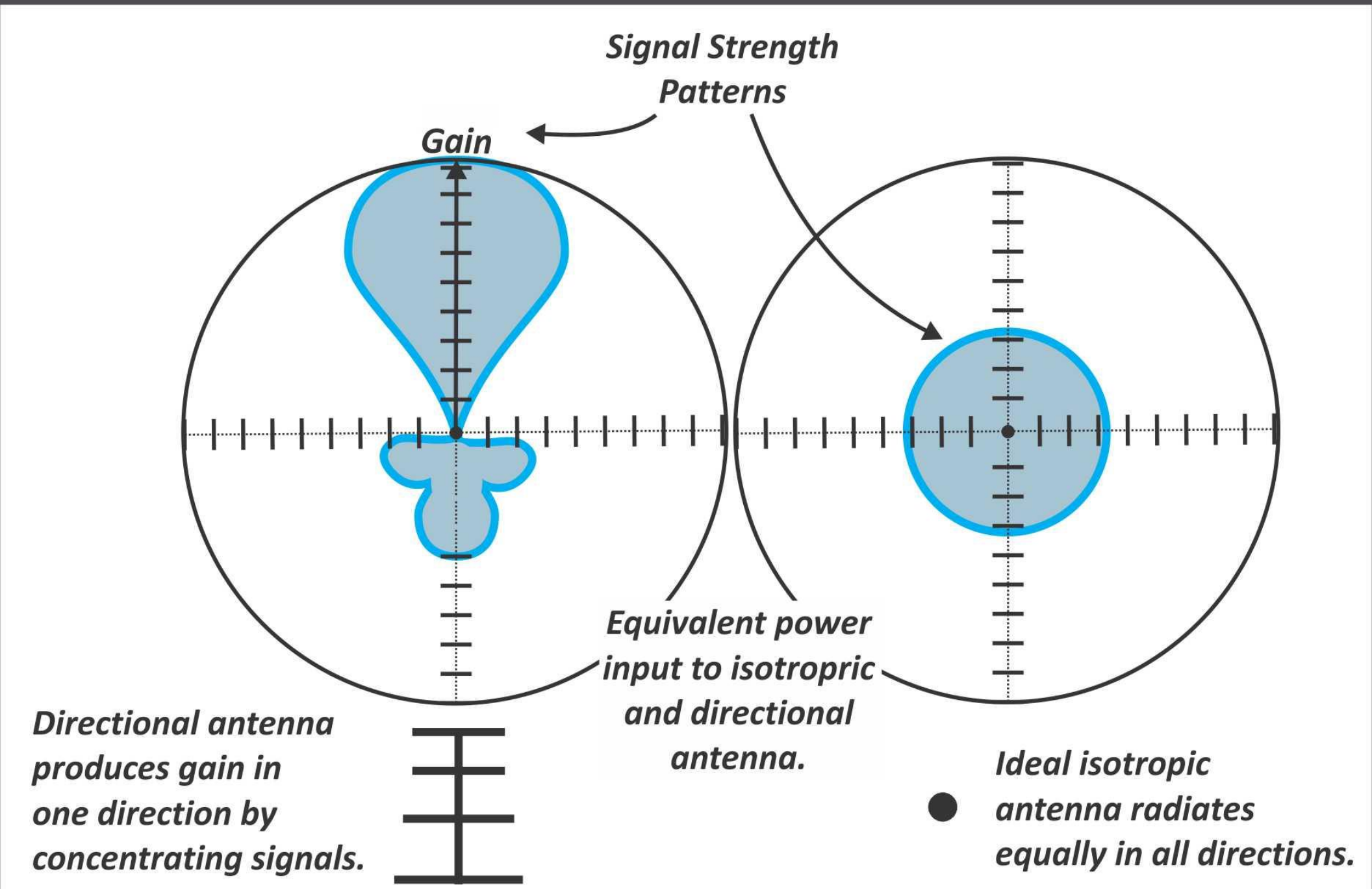



3 dBi
3 dBi
6 dBi
6 dBi
9 dBi
9 dBi


9 dBi
6 dBi
3 dBi
3 dBi
6 dBi
9 dBi

Direction Matters

- Do not body block or shield your HT
- Directional antennas can greatly increase your signal strength vs an omni-directional antenna
- Directional antennas can also greatly DECREASE your signal strength vs an omni-directional antenna

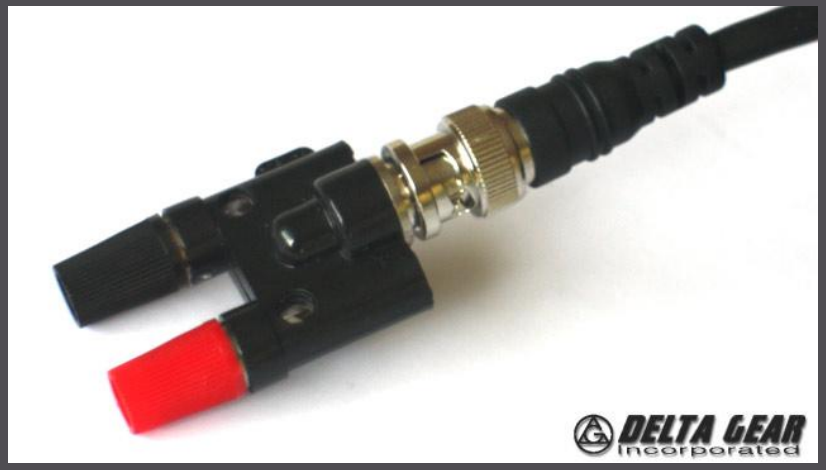

Signal Strength Patterns
Gain
Equivalent power input to isotropic and directional antenna.
Directional antenna produces gain in one direction by concentrating signals.
Ideal isotropic antenna radiates equally in all directions.

Polarization Matters

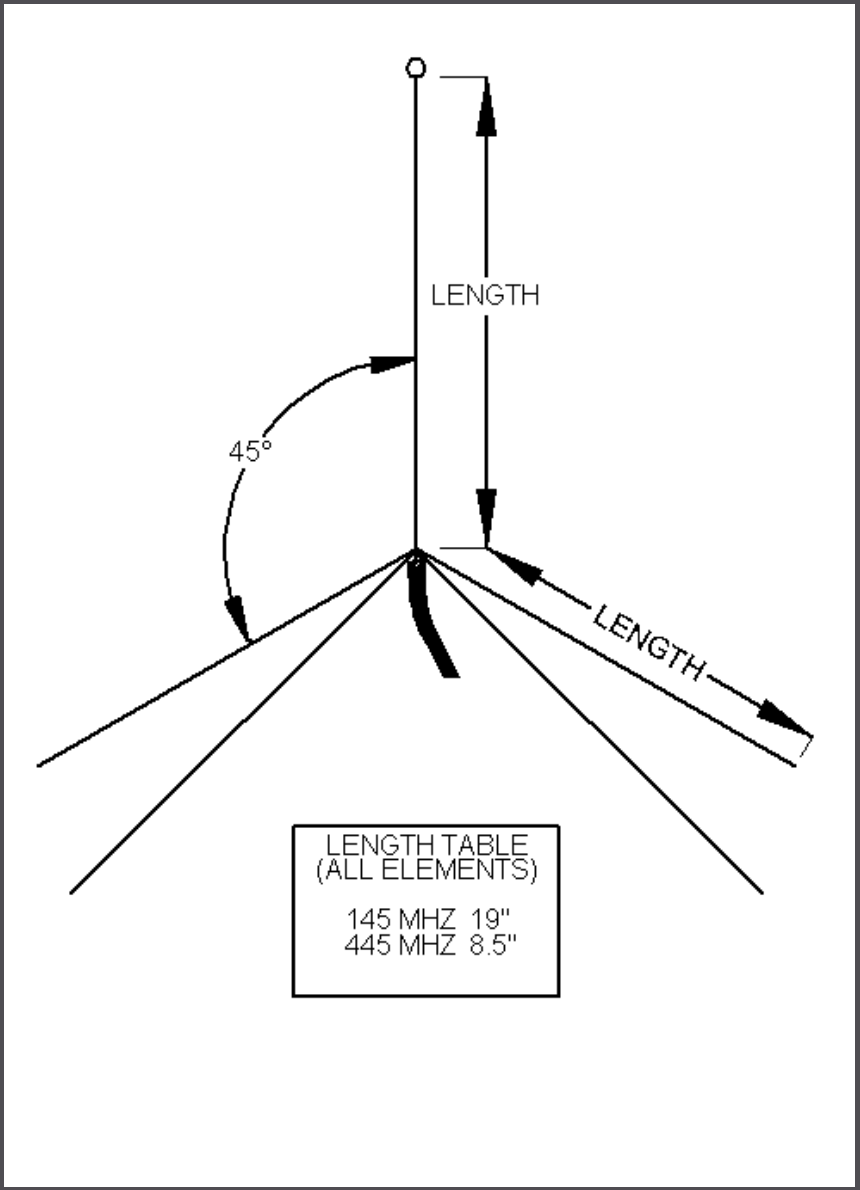
- Antenna polarization can attenuate your signal by as much as 30dB

Field Expedient Antennas

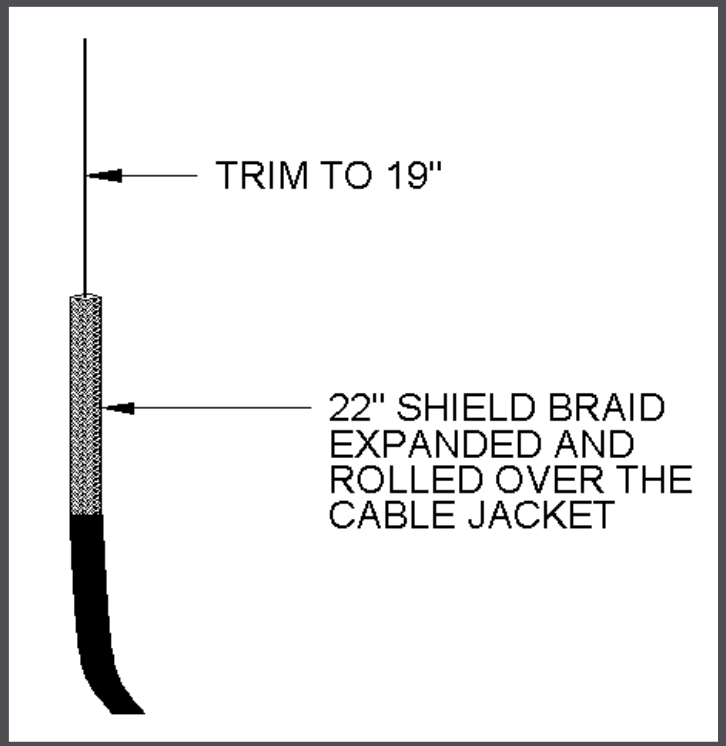
- Antennas that you build in the field from materials that you bring or find around you.
- A few simple supplies in your go-bag can make this effort much easier!



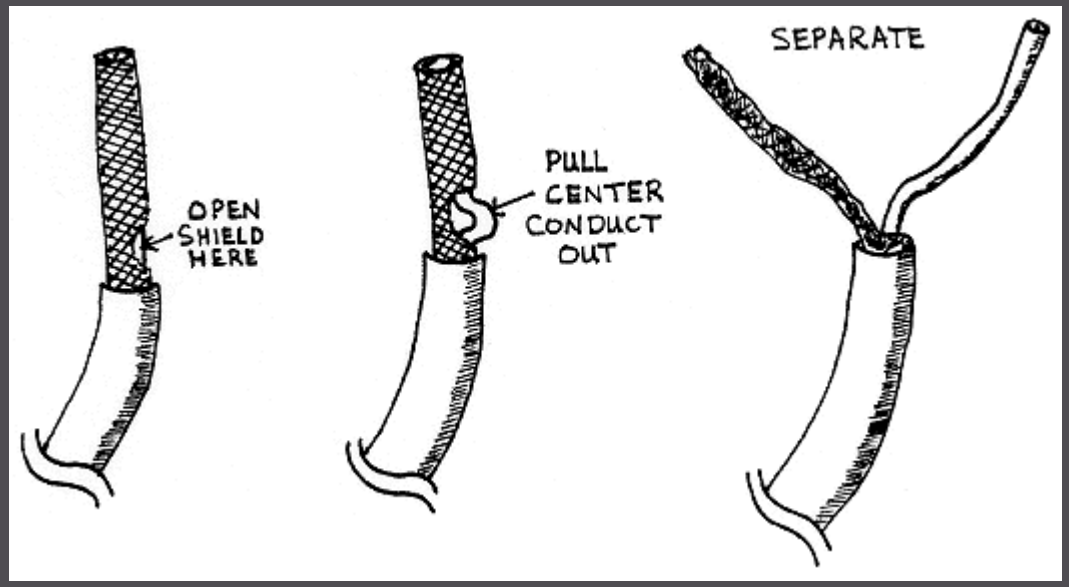
VHF Ground Plane Antenna



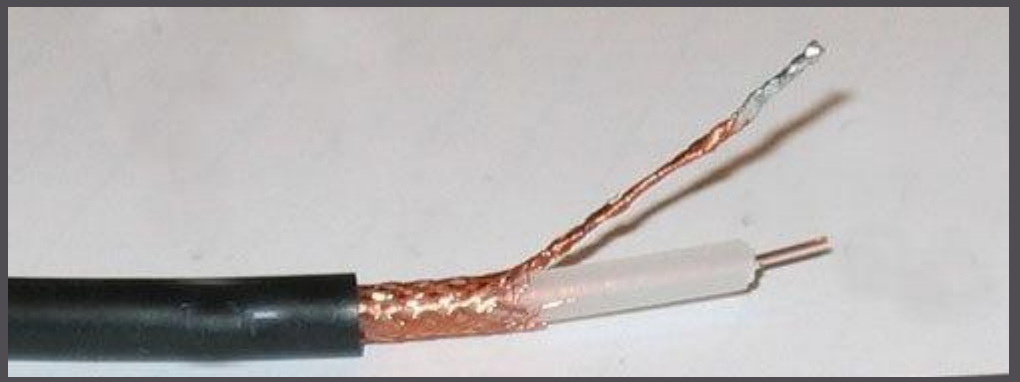
Coaxial Sleeve Antenna



Dipole Antenna

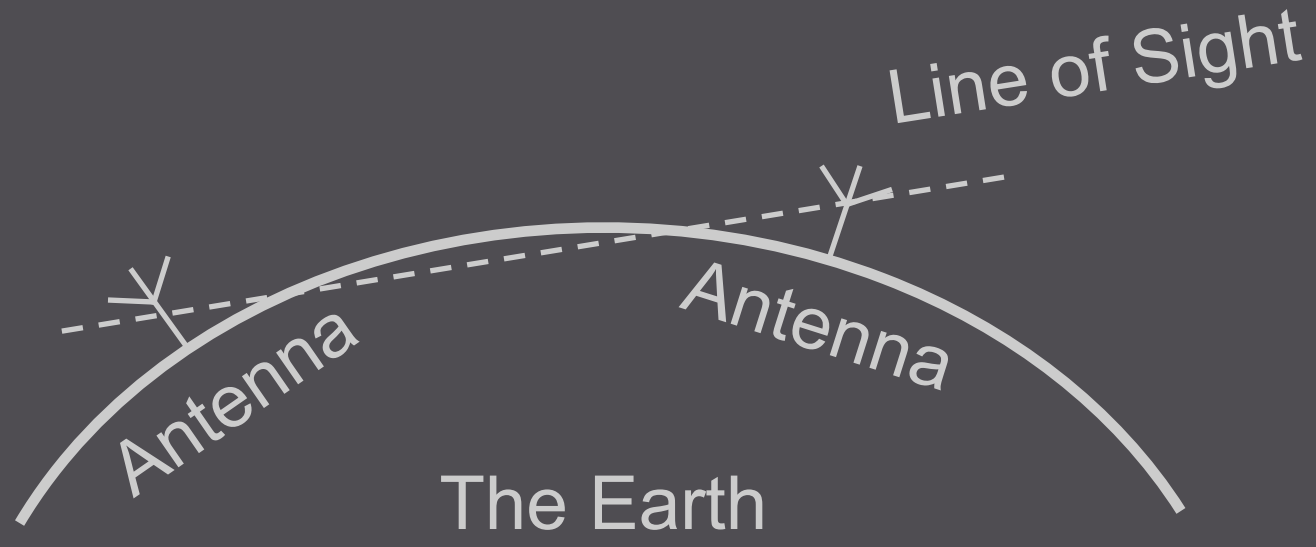


- Length (feet) = 468/frequency (MHz)



Height Above Ground

- VHF and UHF propagation is line of sight
- Curvature of Earth limits signal range
- Increasing height above ground will lengthen signal path



Options for More Height

- Higher Ground
- Tall Structures
- Portable Masts
- Rope a Tree

- http://fieldradiopodcast.org
- Episode 12 Raising Field Expedient Antennas with Paul Cowley KB7VML

Increasing Just Your Received RF

- Radios with better receivers
  - Cheap Chinese HT vs name-brand HT
  - HT vs Mobile
- Pre-amplifiers
  - Increases strength of received signal

Increasing Just Your Transmitted RF

- Turn up the power
- Mobiles in a portable configuration
- Amplifiers

Power Your Radio From Alternative Sources

- Auto cigarette plug or directly off the battery
- HT battery eliminator
- HT AA or AAA clamshell
- Sealed Led Acid Battery (SLA)
- Lithium Iron Phosphate (LiFePO4) Battery

When Radio Just Isn't Working…

- Use your cell phone
- Find a landline
- Send a runner

Have I Sparked Your Interest?

- Complete the survey to indicate which topics you want further discussion
- We will develop additional presentations for deep dive