
	<b>EMERGENCY MEASURES RADIO GROUP</b>
	<b>OTTAWA ARES</b>

Two Names - One Group - One Purpose

# Antenna Design Challenge

# WHY?

When creating something for personal ham use, it is for you and you are making one of them, so it does not matter;

- how it was put together
- where the parts came from
- how long each piece is
- what other people think.

# WHY?

When creating something for EMRG,

- other people have ideas and input
- there is more than one required so materials must be available
- it must be documented so someone else can build or maintain one later
- people have different views on what is acceptable, what they will put in their car, how much they are willing to carry

# EMRG APPROACH

- With each EMRG project, someone on the management team puts together an outline of what is required, then the members of the management team provide input and questions.
- From that input, the project is fine tuned to get the best solution we can think of.
- Prototypes are often built to confirm materials and design, then documentation is created.
- The project can now proceed.

# External Antenna Project

- The external antenna is a problem that EMRG needs to solve for shelter kits, or any portable setup.
- An external antenna is required to use the minimal amount of power, and to ensure the best quality signal possible.
- Antenna Height Objective
  - Clear the roof of a single story flat top building such as a school or community centre
  - Clear the vehicles in a parking lot, including trucks

# DIFFICULTY

- The definition part of the project is difficult because it forces people to make decisions.
  - Is it A or B or C?
  - Does it need this functionality?
  - How long is too long?
  - While you will put it in your car, would other people?
- It may require actually measuring how high is the average truck and a typical one story building. Is it reasonable to clear the top and if so, what is the final height required.

# Some More Thoughts

- The antenna solution is for deployment in a urban or slightly rural area, at a fixed location such as a school, sportsplex, Hospital, etc.
  - This is not meant to be in the middle of nowhere, hundreds of feet in the air
- Cost is a factor, although there is a tradeoff with paying money, Vs organizing people to build something.

# ORIGINAL REQUIREMENTS

- Antenna **solution** for shelter kits.
- Preferably a tri-band antenna (144/220/440) or at minimum dual band (144/440);
  - easy to construct
  - easy to assemble
  - fits in storage container that's easily transported
- "Solution" includes some type of mounting hardware allowing antenna to attach to a mast.



# ORIGINAL REQUIREMENTS

continued

- "Solution" needs to include some type of mast that collapses or comes apart for transportation.
- "Solution" needs to include documentation on how to build the antenna, where to get parts and how to assemble the antenna for use.
- This antenna solution must be robust enough that it can be deployed in wind, rain, and snow.

# ADDITIONAL INFO #1

## 1) Commercial Parts

- Made all from raw materials, or commercial parts

## 2) Power Levels

- Needs to support 50 watts.

## 3) Mast Height

- Assume 20 feet maximum height, with 15 feet as an acceptable minimum height.

## 4) Base For Mast

- You are welcome to build one or more types of bases, they need to be built sometime.

# ADDITIONAL INFO #2

## 1) Arrow Dual Band J-Pole

- This project is not a search for ideas, it is a search for a complete documented solution that can be demonstrated and tested.
- If the Arrow is suitable, then someone needs to buy one, figure out a mast for it and how to attach the antenna to the mast, all in a way that is easy to assemble for set up at a shelter.

## 2) Mast Section Length

- Objective is to transport the mast and antenna inside a car, so maximum length of mast is 4 ft.

# ADDITIONAL INFO #2

continued

- 1) Antenna Mast Connection - What is the issue?
  - Most antennas come with u-bolts which is great for a permanent installation, but not always easy to work with for a portable system. As a minimum, the kit must include a wrench to fit the bolts.

# ADDITIONAL INFO #2

continued

## 1) How important is Tri-Band Vs Dual Band

- In a typical shelter, there will be at least 1 voice and 1 data channel.
- There may be a need to do crossband repeating, so there is an IN and an OUT frequency
- It is also possible that there will be 2 voice channels and a data channel.
- Tri-band solution provides a standard solution that maximizes options. Dual band is the fallback, but tri-band is preferred.

# Additional Info – New

## 1) Diplexers & Triplexers

- The EMRG plan is to use all bands simultaneously, plus EMRG typically uses single band radios, so diplexers or triplexers will be required.

# Dave Harris Comments

- Dave Harris provide several comments about the project, which are shown on the following slides.
- Dave thought through the requirements and in some cases challenged them, with well thought out reasons.
- This is what was is required to reach a “Best Possible” solution!

# Dave Harris' Comments

continued

1. Dual-band (146/440) antennas are a compromise over single-band. A tri-band antenna will be a further compromise.
  - Dual-band antennas if purchased seem to be a whole lot more common, therefore easier to replace
2. I have not seen any public 146-222-440 band antenna designs, which is not to say they aren't out there.
  - If home-built, do these require special precision machining i.e. could be done by hams?
  - How robust will these built designs be, compared to rugged single/dual-banders?



# Dave Harris' Comments

continued

- 1) Why would 220 be necessary to deploy for all/most situations?
  - Impression I have is it for special cases, and the amount of available equipment is limited anyway. 220 may require or benefit from a yagi, which separates it from the other antennas.
- 2) If a 3-band antenna has a single feed, how will up to three radios be MUXed to it?
  - Diplexers can do it but at what extra cost? These would need to be part of the kits.
  - Do we really want to try to MUX packet with voice on the same antenna?

# Dave Harris' Comments

continued

- 1) Regarding not building a "J-Pole" why not?
  - A 144-440 version with two feeds would eliminate the need for a diplexer.
  - Even with the price of copper, it would be cheaper than most commercial dual-banders, and is rugged.
  - The sections can be joined by simple friction fittings or screw-on couplers.

# Dave Harris' Comments

continued

- 1) If 3-band antennas are purchased (not built) how many can EMRG afford to deploy; will it be enough?
- **I propose the objective is changed to focus on a single 146/440 antenna with a separate 220 antenna as an option i.e. hanging off the same mast.**

# A Few More Things

- Radials
  - How do they attach?
  - How do they store so they are not lost?
  - How do you ensure they are not a hazard?
- One piece vs 2 piece design
  - One piece makes the antenna as simple and durable as possible
- Dualband + 220 Antenna
  - Which antenna for 220?
  - How does the 220 antenna attach with the dualband?

# www.emrg.ca

The EMRG web site provides information related to Amateur radio emergency communications, specifically as it relates to the City of Ottawa.

- Project Information
- Newsletters
- Upcoming Events
- Documentation
- Links to related information

Information: **planning @ emrg . ca**