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|  | EMERGENCY MEASURES RADIO GROUP |
|  | OTTAWA ARES |

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) Duplexers & Triplexers

- The EMRG plan is to use all bands simultaneously, plus EMRG typically uses single band radios, so duplexers 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**