



## EMERGENCY MEASURES RADIO GROUP



## OTTAWA ARES

Two Names - One Group - One Purpose

# General Meeting

## 2006-09-30

# 1 Year Later

**What Can We Learn About  
Providing Emergency Radio  
Communications?**

# BETTER THAN NOTHING

Some Amateurs believe that whatever we provide is better than nothing.

- In an emergency/disaster people have expectations for communications, based on their normal world experiences.
- They don't expect to have their "normal" communications, but they want as close to normal as possible.
- Sometimes providing something "better than nothing" is viewed as nothing, so people look for something better!

We need to provide effective communications that meets user needs. We need to do the best that we can!

# DEPLOY IN TEAMS

## X Amateurs $\neq$ Communications Team

- End user groups are not looking for radios or radio operators, they want effective communications!
- Effective communications typically requires some infrastructure
- Implementing an effective communications solution requires a team approach, not a random group of individuals.

We cannot assume that if a random group of Amateurs comes together, they can provide effective communications!

# WE ARE REGULAR VOLUNTEERS

- Amateur radio volunteers are volunteers with a radio.
- Public Safety (Police, Fire, EMS) do not let volunteers into an area until it is considered reasonably safe.
- Public Safety does not look to Amateur radio to provide interoperability.
  - They can hold 2 radios themselves
  - There are numerous commercial interoperability solutions available
  - Many of the interoperability issues are not radio related

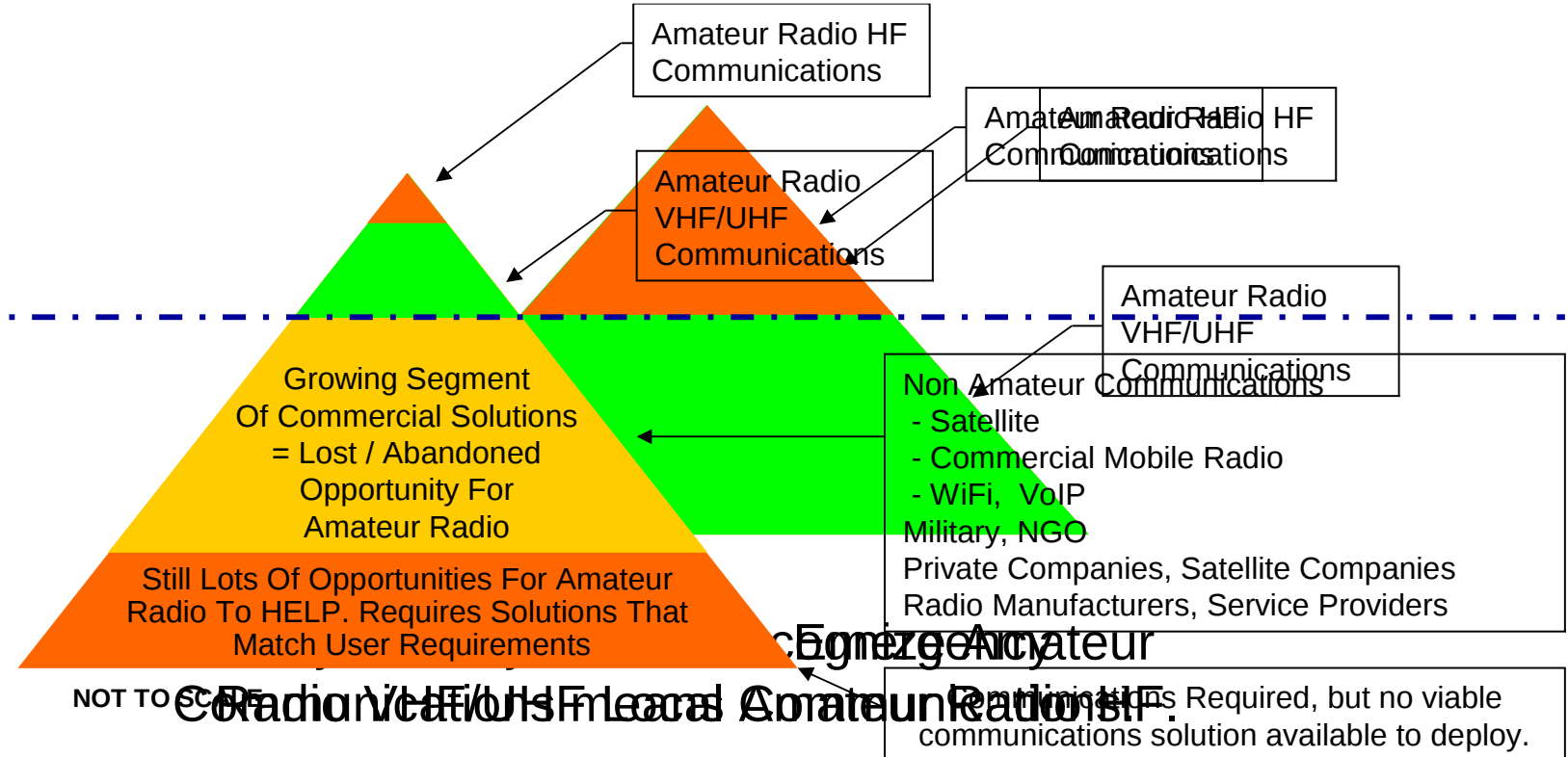
We need to be clear on our role and be dedicated to it!

# “EVERYTHING FAILED”

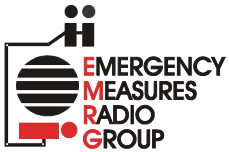
- In our world today with multiple types of communications, redundant networks and multiple service providers, having “Everything Fail” is unlikely to occur.
- Some things will fail, some things will work, but lose connectivity to the rest of their network.
- Some things can be fixed temporarily or portable equipment can be brought in to fill some gaps.

We need to understand and be truthful about what really happened!

# Amateur Radio = Tip Of The Iceberg



What most Amateurs do not see is the massive amount of commercial communications and the requirements for communications that are not filled.



# SATELLITES PROVIDE LONG HAUL SOLUTION



Harris has reconfigured and diverted 12 C-band satcom terminals originally destined for Africa to provide vital communications lifelines throughout Mississippi and Louisiana. These satcom terminals will provide vital voice, data, Internet, and fax capabilities - and telemedicine video. <http://www.harris.com/katrina/>

Satellite telephone provider Globalstar and its dealers deployed over 10,000 phones to the region in the first five days after Katrina struck. Globalstar rival Iridium has delivered a similar number, is shipping another 6,000 and expects orders for thousands more in the coming days and weeks. [http://www.space.com/spacenews/businessmonday\\_050912.html](http://www.space.com/spacenews/businessmonday_050912.html)

Communications between Red Cross aid stations and back to their national headquarters continues to be an enormous challenge as they face an ongoing, long term aid situation in Louisiana, Mississippi, and Alabama. In light of this the American Red Cross chose Telex/Vega IP-223 Dual IP-Adaptor Panels and C-Soft Software Based Dispatch Consoles to create a flexible, reliable emergency communications system. High power, low-band VHF radios, located at tower sites across the affected area have been bridged onto an IP-based network, which is then connected directly to satellite uplink devices. The satellite broadcasts are then being transmitted to 3 regional emergency dispatch centers. The solution allows all relief centers to communicate with central dispatch, and with each other, using simple portable two-way radios. <http://www.policeone.com/police-products/communications/dispatch/press-releases/119206/>

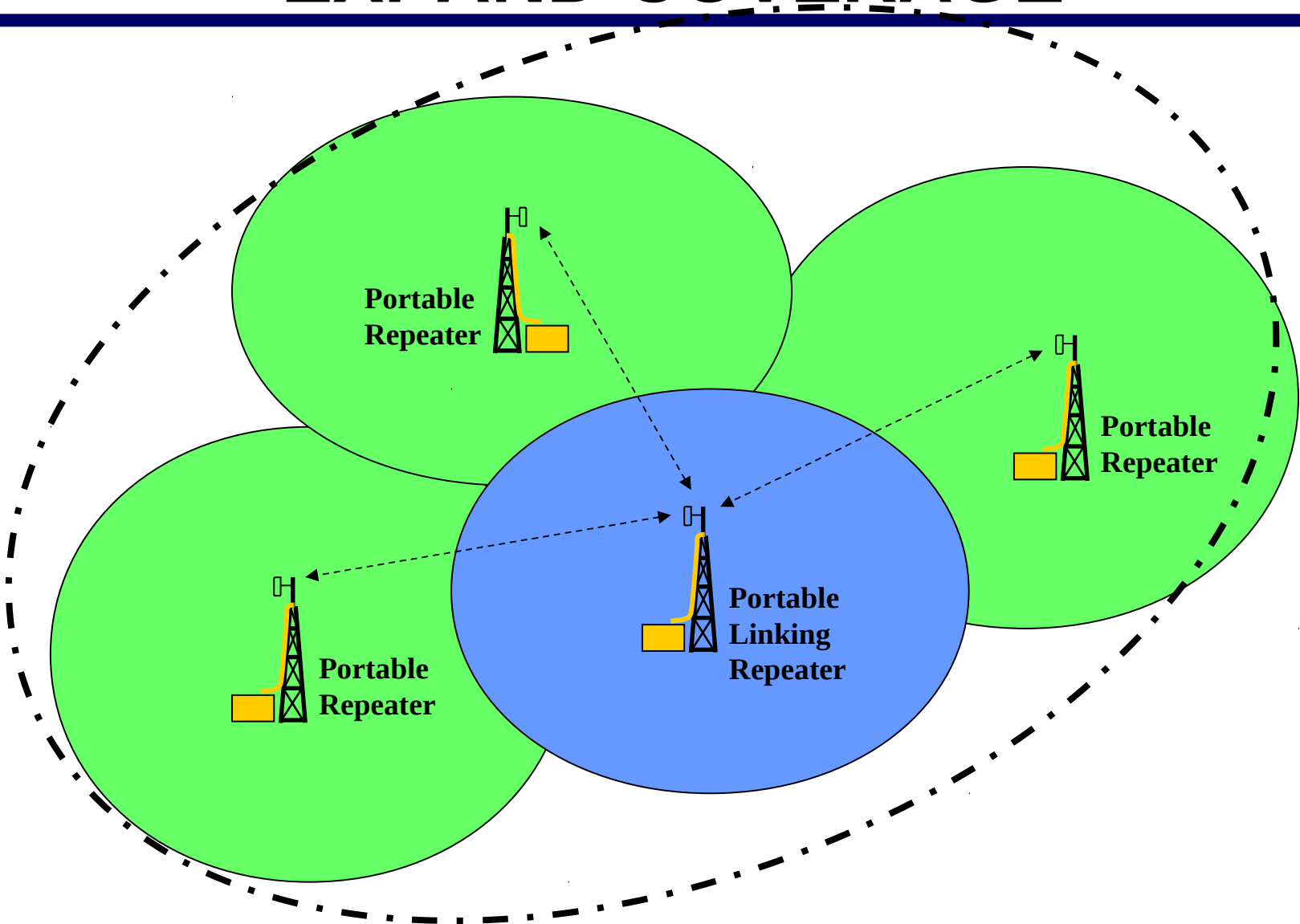


# PORTABLE INFRASTRUCTURE

- The radio operator needs to be co-located with the people who need communications.
- The radio antenna should be located as high as possible.
- The distance between the user and the best antenna location is usually too far to run coax.
- Running between the users and the radio is not acceptable.

A portable repeater can help solve this problem. The user can co-locate with the people needing support and the repeater antenna can be located in the best available location.

# EXTEND REACH EXPAND COVERAGE



# TRAINING

# Time To Stretch Your Brain

**Remember - There are no  
wrong answers, just  
different ideas!**

# GROUP THINK

- It is Tuesday morning. The power has been out since Sunday night, due to a combination of transmission line and generation failures. It looks like power will be out for an indefinite term.
- Telephone service is intermittent, due to the loss of some cell sites and overhead telephone wiring.
- The city is advising those who are able, to shelter in place, and offering to shelter others in one of four shelters being opened up in various parts of the city. They estimate that if conditions remain unchanged they will have about 10,000 residents in shelters by Thursday.

# GROUP THINK

- You have been asked to report to a city works yard on Industrial Avenue to provide communications, either at a shelter, for a street patrol, or for some other fixed site.
- Weather forecast is as follows:  
Wednesday -Freezing rain continuing, then colder, high minus five, low minus 15.

**1) What do you need to do BEFORE you head out the door?**

**2) What else would you ask?**

# Looking For Volunteers

# REPEATER CONTROLLER

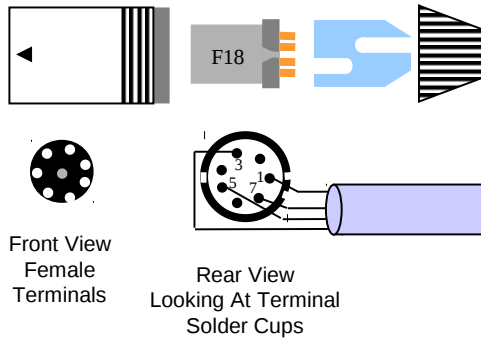


EMRG bought the controller kits, Mike Kelly put them together.  
Now we need to get the controllers installed into metal boxes.



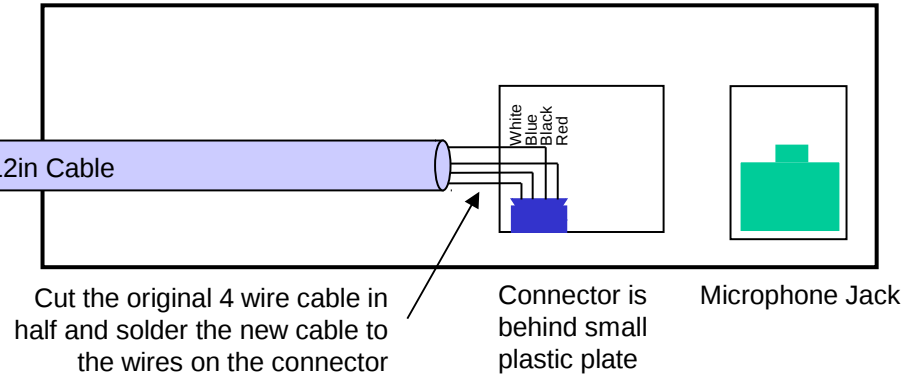
# KENWOOD REMOTE CONTROL HEAD

## Neutrik Connector

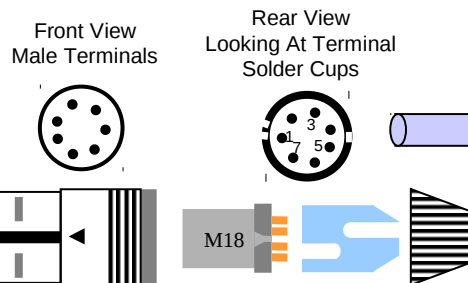


## Kenwood TH742A TriBand Radio

Front view with the control head removed.

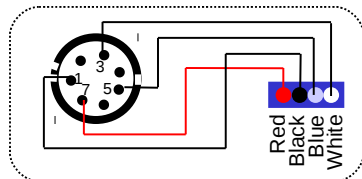
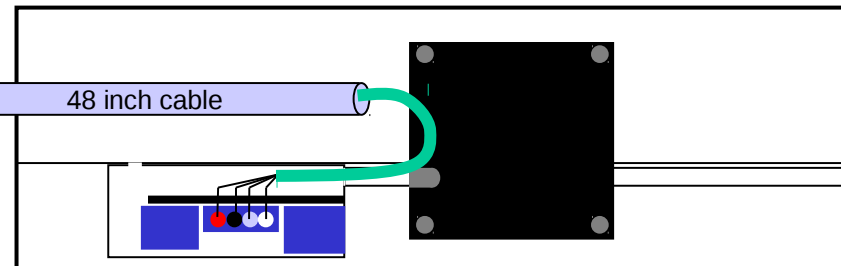


## Neutrik Connector



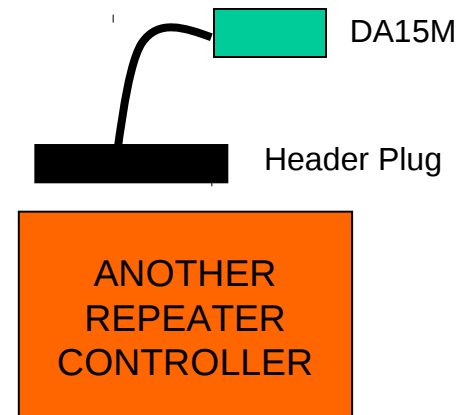
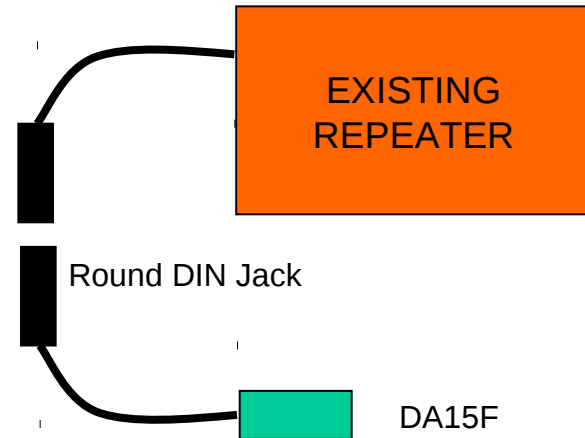
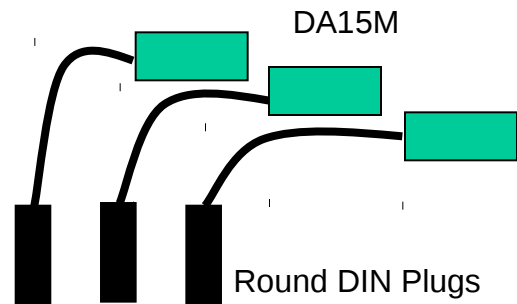
## Kenwood TH742A TriBand Radio Control Head

Back view with the control head removed from the radio



The control head can be split into two parts. Do not split, keep the two parts together

# REPEATER CONTROLLER CABLES



Parts being ordered this week. Should arrive by mid next week.  
All drawings and parts provided.

# DTMF KEYPAD

EMRG needs a source for DTMF keypads. These would be installed into all permanent radio locations, as well as into the Standard User Interfaces.

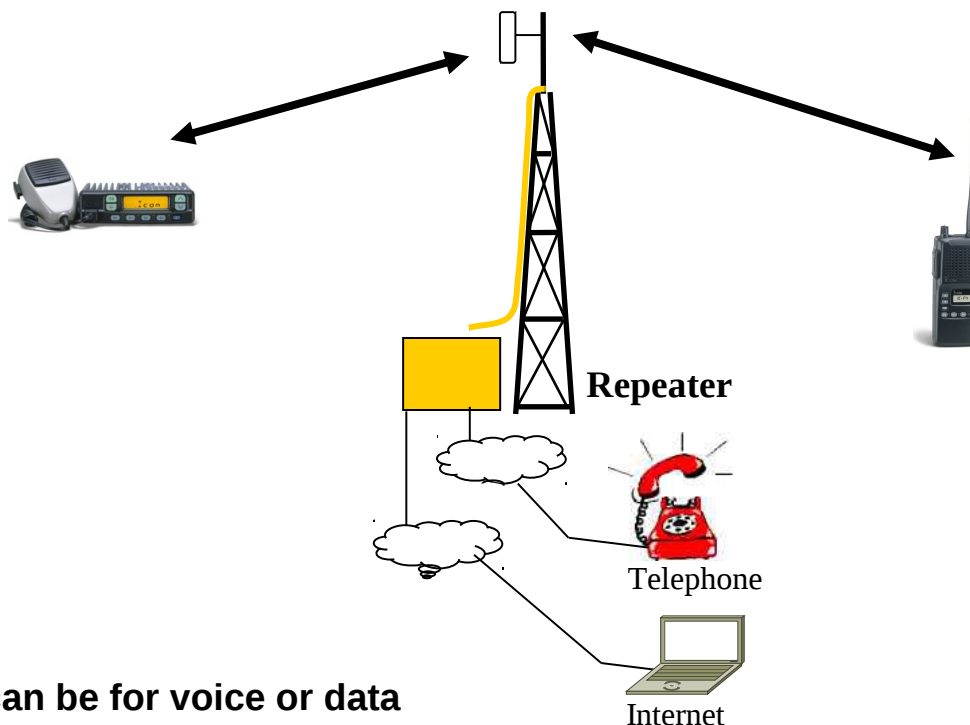
1	2	3	A
4	5	6	B
7	8	9	C
*	0	#	D

We need someone to look for options, try some things out and deliver a proposal with a source for keypads and any optional wiring required to make it work on a standard radio microphone input.

# Strategy & Current Activity

# RADIO REPEATERS

Repeaters link users within an area who cannot otherwise communicate directly, radio to radio. The coverage area could be City wide, within a local community or between a few buildings.



**Repeaters can be for voice or data communications and can interface to the telephone network and the Internet.**

# REPEATER STRATEGY

## RELIABILITY

Repeaters must be dependable

- Withstand continuous use for days in an emergency
- Generator backup, with battery backup in case of generator failure
- Quality parts and workmanship
- Regular testing and maintenance

## DIVERSITY

Some repeaters may not be functional in an emergency, so sufficient capacity is required to maintain effective coverage with some infrastructure loss.

- More than one site that can cover an area
- Sites independent of other radio systems

## CHANNEL CAPACITY

User requirements and message volumes will vary, so more than one repeater and coverage area is required to effectively meet user needs.

- Multiple repeaters on different bands
- Channels should meet user throughput volume and speed. Some groups may need a dedicated repeater so messages never wait.

# EMRG REPEATERS

## VE3OCE VHF - 146.880 (-)

- CSQ In & 136 Hz Tone Out
- Wide Area VHF Repeater
- Provides coverage across most of the City Extended range with cross band repeaters

## VE3OCE UHF - 443.800 (+)

- CSQ In & 136 Hz Tone Out
- Regional UHF Repeater
- Provides coverage in Central core of the City.
- Deployment This Fall

## VE3OCE Packet - 145.030

- Provides good coverage in the Urban areas
- Partial coverage City wide.

## VA3OFS VHF - 146.670 (-)

- 136 Hz Tone In & Out + CSQ In
- South/Regional VHF Repeater
- Provides coverage in the Southern portion of the City and Central core.

## VA3EMV/E VHF - 146.985 (-)

- 100 Hz Tone In & Out
- East End Community VHF Repeater
- Provides local coverage from Blackburn Hamlet to the Eastern edge of Ottawa..

## VA3EMV/W VHF - 146.985 (-)

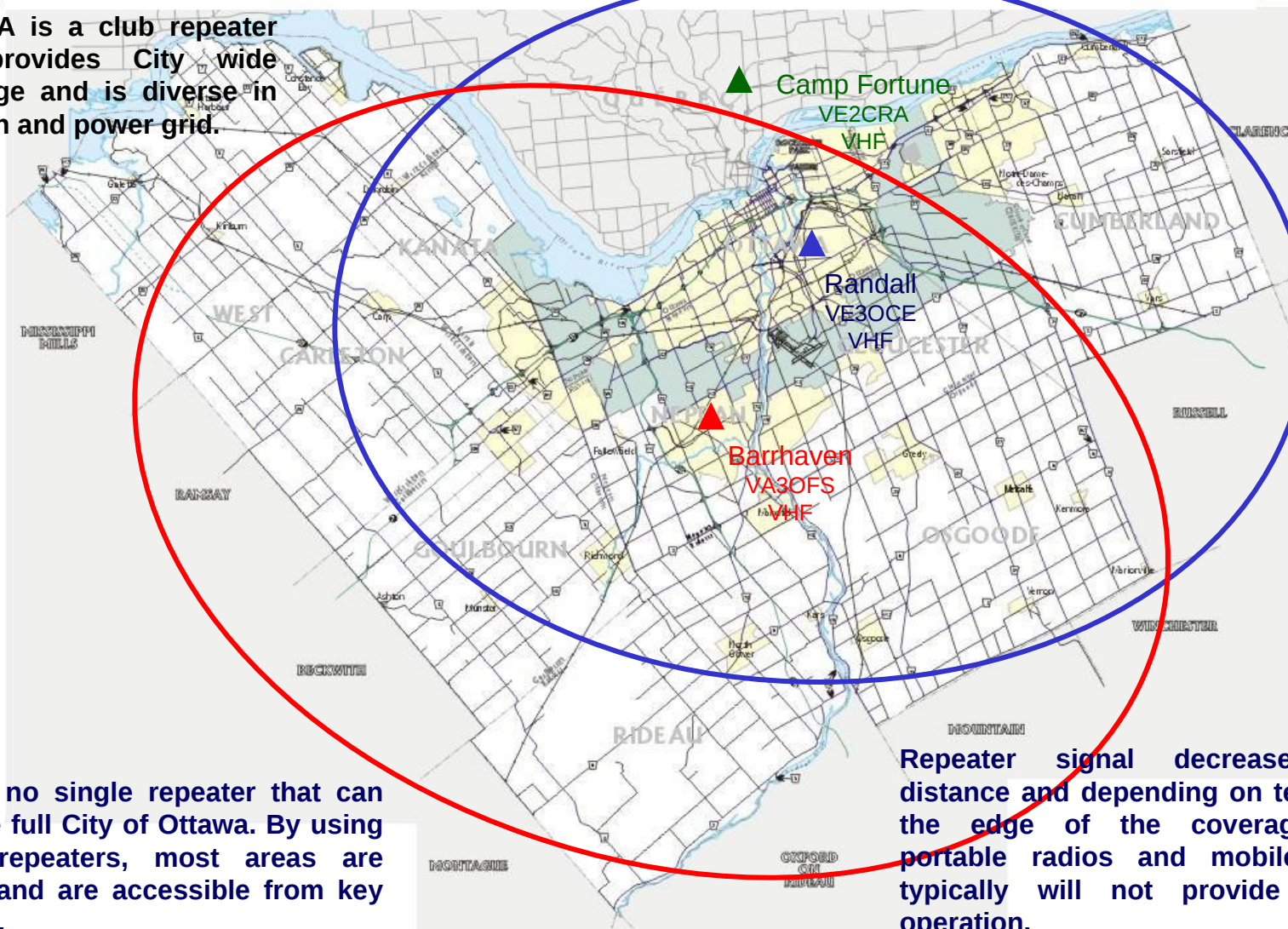
- 123 Hz Tone In & Out
- West End Community VHF Repeater
- UNDER CONSTRUCTION : Provides local coverage for most of West Carleton and Stittsville area.

## VA3EMV/P VHF - 145.110 (-)

- 136 Hz or CSQ In & 136.5 Hz Tone out
- Portable VHF Repeater
- Provides coverage in local area if required.

# CITY WIDE REPEATERS

VE2CRA is a club repeater that provides City wide coverage and is diverse in location and power grid.

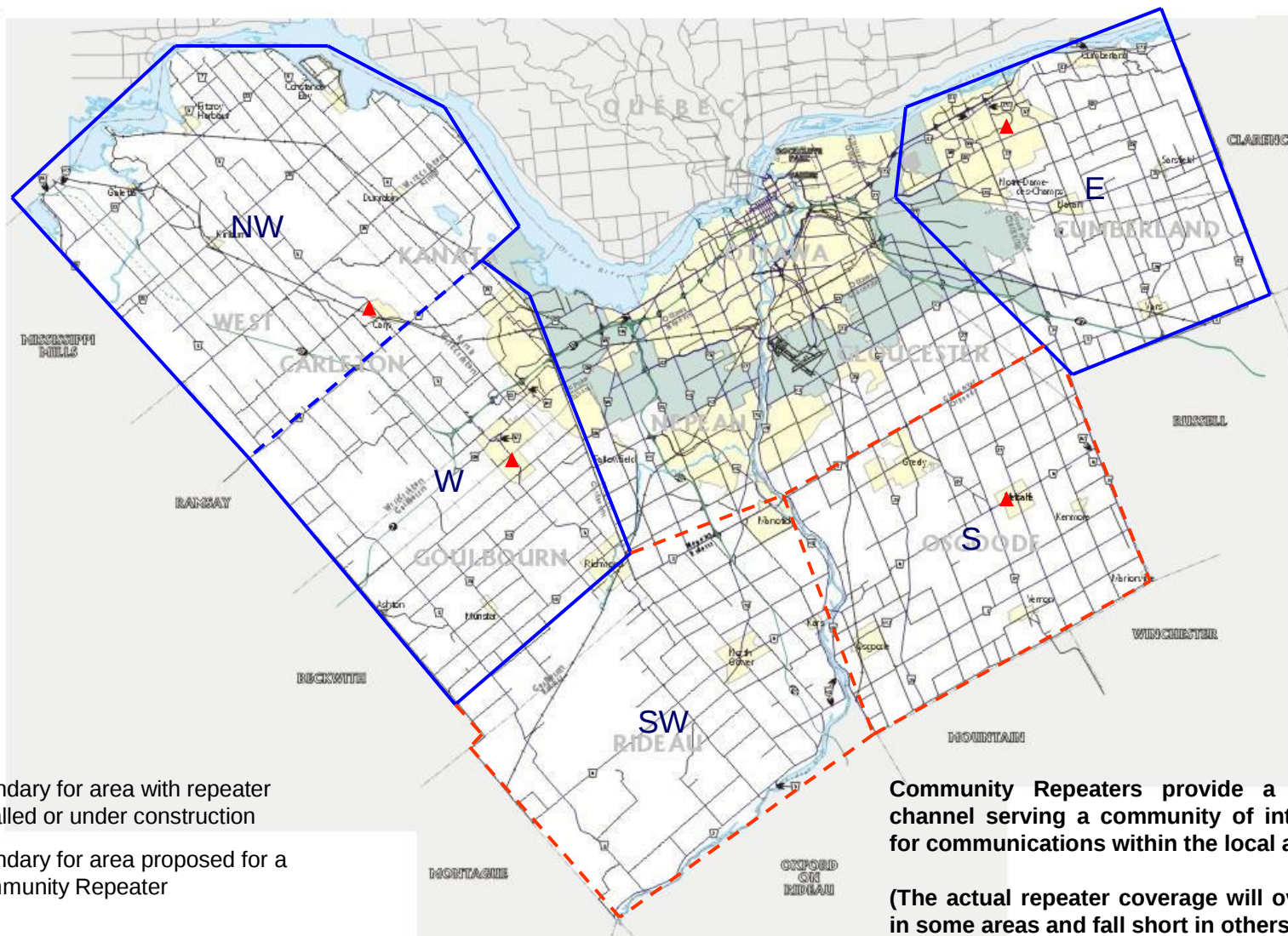


There is no single repeater that can cover the full City of Ottawa. By using several repeaters, most areas are covered and are accessible from key locations.

Repeater signal decreases over distance and depending on terrain. At the edge of the coverage area, portable radios and mobile radios typically will not provide reliable operation.



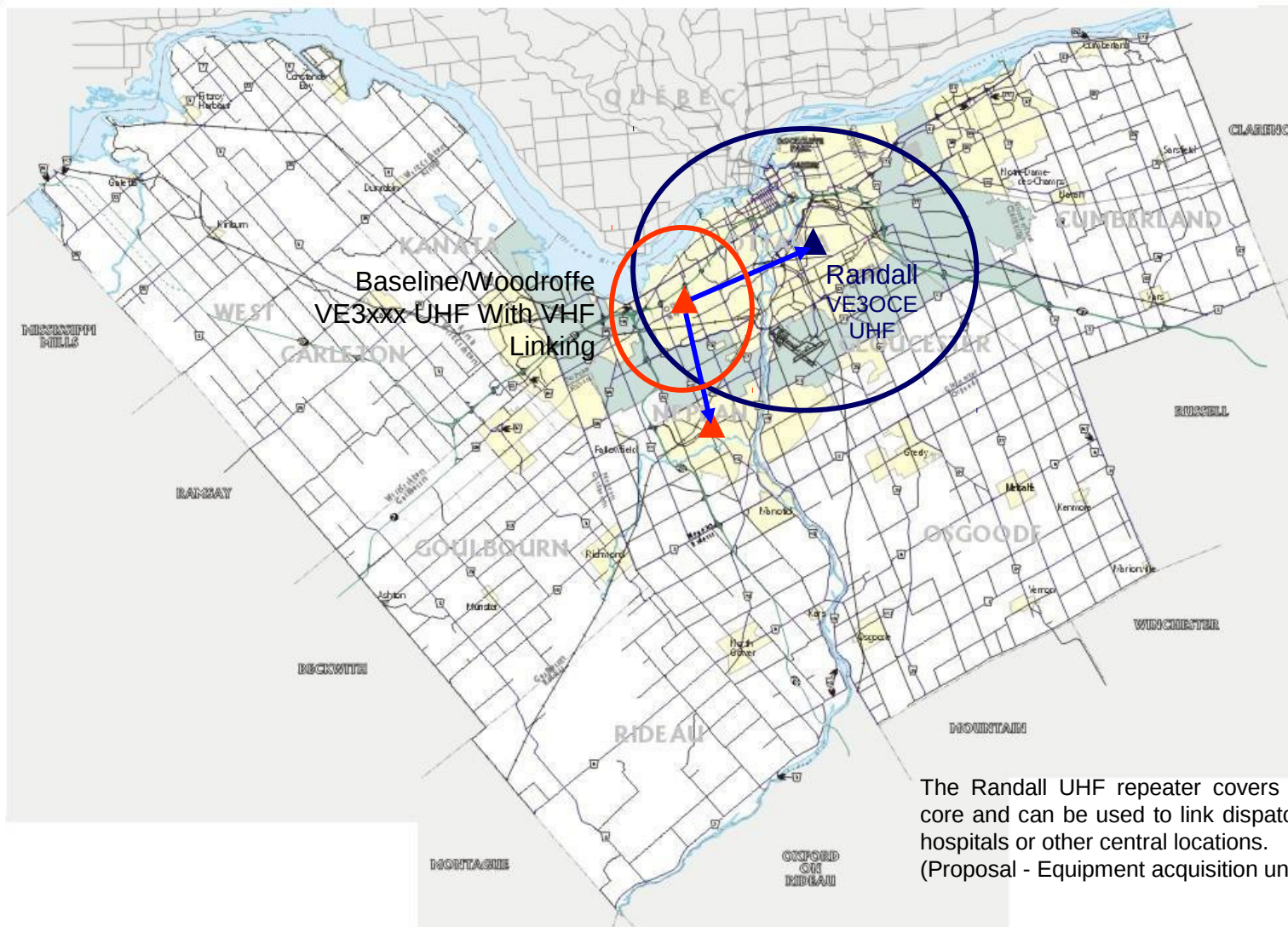
# COMMUNITY REPEATERS



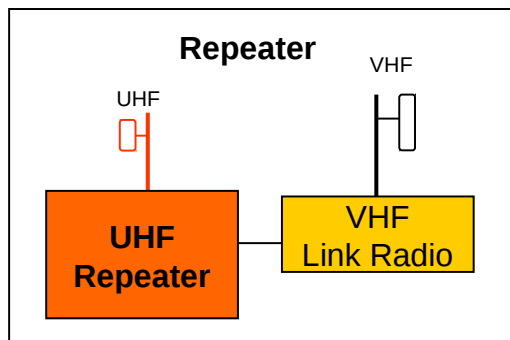
Community Repeaters provide a voice channel serving a community of interest, for communications within the local area.

(The actual repeater coverage will overlap in some areas and fall short in others.)

# SPECIALITY REPEATERS







# Generators & Batteries

**They Are Not All Equal!**

# BACKUP POWER?

Many Amateur groups state that their repeater is ready and available for emergency use;

- It is in a site with Generator Backup
- It has battery backup

These statements can be misleading;

## **Generators**

- Is your repeater plugged into an AC outlet connected to the generator?
- How long does it take for the generator to start?
- What is the designed run time for the generator? (How much fuel is stored on site?) Environmental rules may limit on site storage.
- What happens if the generator does not start? - Generators do fail sometimes!

## **Batteries**

- What is the current draw of the repeater?
- What is the AH rating of the battery?
- How old is the battery?
- How is the battery charged?
  - How fast can the battery recover once discharged?
  - Is the battery overcharged, causing heating and water evaporation?

# OUR BATTERIES



**POWER *PS* SONIC**

**Rechargeable Sealed Lead-Acid Battery**

**PS-121000**  
**12 Volt 100 Amp. Hrs.**



**Features:**

- Absorbent Glass Mat (AGM) technology for superior performance.
- Valve regulated, spill-proof construction.
- Power/volume ratio yielding unrivaled energy density.
- Built-in (recessed) battery handles for safe and easy transport.
- Approved for transport by air. D.O.T., I.A.T.A., F.A.A. and C.A.B. certified.
- U.L. recognized under file number MH 20845.

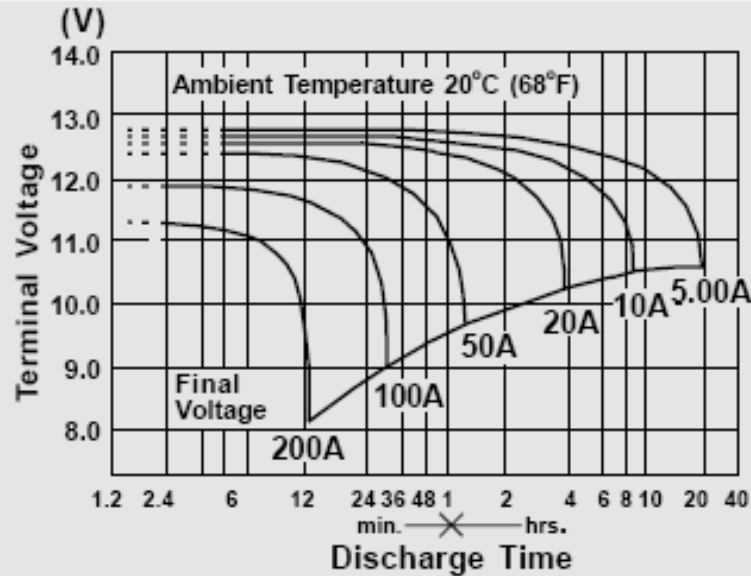
# BATTERY SPECS

## PERFORMANCE SPECIFICATIONS

Nominal Voltage.....	12 volts (6 cells in series)
Nominal Capacity	
20 hour rate (5.0A to 10.50 volts) .....	100.0 A.H.
10 hour rate (9.2A to 10.50 volts) .....	92.0 A.H.
5 hour rate (15.8A to 10.20 volts) .....	79.0 A.H.
1 hour rate (55.2A to 09.00 volts) .....	55.2 A.H.
15 min. rate (175A to 09.00 volts) .....	44.0 A.H.
Approximate Weight.....	68.7 pounds (31.2 kg)
Energy Density (20 hour rate).....	1.85 Watt-hours/cubic inch (112.8 Watt-hours/l)
Specific Energy (20 hour rate) .....	17.5 Watt-hours/pound (38.5 Watt-hours/kg)
Internal Resistance (Fully Charged Battery) .....	3.4 milliohms (approximately)
Maximum Discharge Current (7 Min.) .....	300 amperes
Maximum Short-Duration Discharge Current (10 Sec.) .....	1000 amperes
Terminals .....	"U" - Universal terminals: heavy duty posts with nut & bolt ("NB") fasteners
Shelf Life — % of nominal capacity at 68° F (20° C)	
1 Month.....	97%
3 Months.....	91%
6 Months.....	83%
Operating Temperature Range	
Charge.....	-4°F (-20°C) to 122°F (50°C)
Discharge.....	-4°F (-20°C) to 140°F (60°C)
Case.....	ABS Plastic

# DISCHARGE

*Discharge Characteristics*



**NOTE:** Due to the self-discharge characteristics of this type of battery, it is imperative that they be charged after 6-9 months of storage, otherwise permanent loss of capacity might occur as a result of sulfation.



# BATTERY CAPACITY

A 30 watt repeater has roughly the same power consumption as a mobile when transmitting (appx 10 Amps)

Starting with a 100AH battery

- Standard Discharge Time called C20 = 20 hours
- $100 \text{ AH} / 20\text{H} = 5 \text{ Amps}$

Battery 10 hour rating = 92AH = 9.2 Amps

- For easy math we will assume 90AH = 10 Amps for 9 hours

Battery never really at peak

- Assume battery at 80% due to age and current charge state
- 80% of 90 AH = 72AH
- $72\text{AH} / 10\text{A} = 7.2 \text{ Hours}$

The single battery provides enough time to make a plan to get more batteries, abandon the repeater, or replace a generator that failed!

# City Of Ottawa Antenna Bylaw

# **EMRG RESPONSE**

**Our concern with the bylaw as written, specifically section 120, is that it would inhibit a viable Amateur radio community in Ottawa, by limiting the number and location of Amateur antennas. This will cause a drastic decline in the number of Amateur radio operators in Ottawa over the next few years.**

**The EMRG membership and skill sets are drawn from the local Amateur community, so if there are less Amateurs in Ottawa, there are less people to participate in EMRG. Installing antennas at home, and operating from home, is a critical component of the hobby. Therefore having a viable Amateur radio community in Ottawa requires the ability to install suitable antennas.**

# EMRG RESPONSE

Not all Amateur radio operators participate in Emergency Communications. There is a pool of about 10% of the Amateur community who share an interest in Amateur radio and public service. This pool of people changes over time as personal circumstances change. There are numerous people who develop new solutions, design and test antennas or otherwise develop infrastructure that is used or adapted by EMRG for use as part of our Emergency Communications solutions.

# EMRG RESPONSE

We understand that with the ability to enjoy our hobby comes a responsibility to be good neighbours. The National Amateur radio organization, the Federal Government dept regulating Amateur radio, and most radio amateurs, agree that dialogue with neighbours is the first step in establishing any new significant radio antenna or supporting structure.

We also understand that guidelines and recommendations are required to help establish what our community feels is acceptable. For this reason, we support development of a set of guidelines for Amateur radio antennas and supporting structures. The City of Calgary Policy Guidelines provide an example of such a solution. (See Document Attached)

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

Team Leader: Peter Gamble - VE3BQP  
(VE3BQP@RAC.CA)