

# Crossband Repeaters (CBR)

OCCA Meeting

April 10, 2017

# Crossband Repeaters (CBR)

**What do we mean by a Cross-Band Repeater or CBR?**

**Crossband (cross-band, cross band)** operation is a method of communication in which a radio station (mobile) receives a signal in one band and simultaneously transmits on another band for the purpose of full duplex communication or signal relay.

# Crossband Repeaters (CBR)

## **Put another way:**

A CBR is simply a mobile, activated in CBR mode, that receives a signal in one band and re-transmits what they hears on another band or “across bands”

70cm => 2m or 2m=>70cm

Our example tonight uses

2m=>70cm CBR operating on 146.430=>447.525

# Crossband Repeaters (CBR)

**Standard repeaters operate “in-band”**

Re-transmits what it hears on another frequency  
“in the same band”

447.525 => 442.525

**Cross-Band repeaters (CBR’s) operate “across bands”**

Re-transmits what it hears on another band or “across bands”

146.430 => 447.525

# Crossband Repeaters (CBR)

## Typical CBR configurations

One-Way Crossband - also known as “Range Extenders”

Two-Way Crossband - also known as “Potential Problems”

Very high “duty cycle” on the CBR

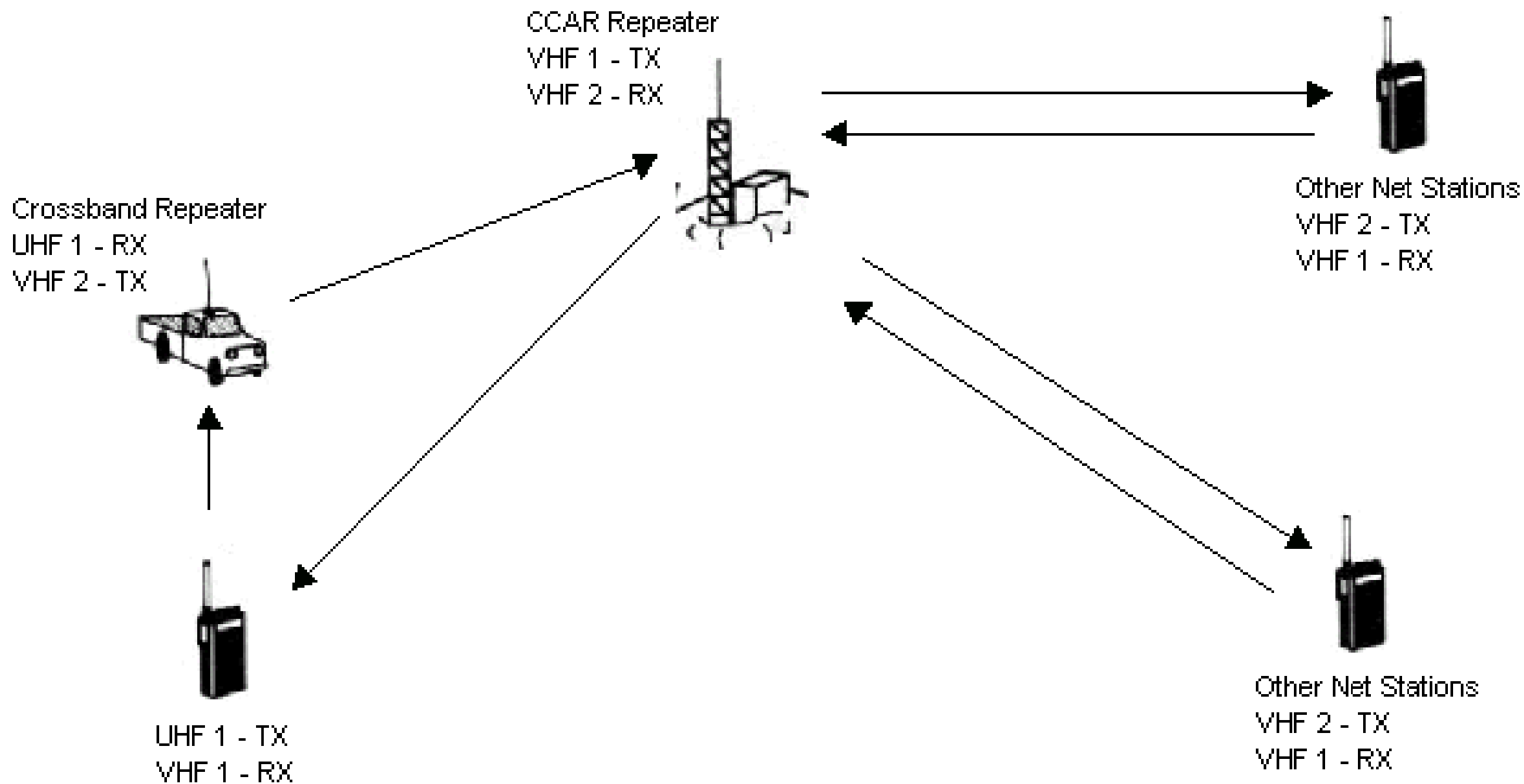
Very high potential to lock-up repeaters

Tonight, we will only use One-Way or Range Extender CBR’s

# Crossband Repeaters (CBR)

**Let's look at a diagram of a typical cross band repeater (CBR)**

# Crossband Repeaters (CBR)



**Range Extender Crossband Repeat**

# Crossband Repeaters (CBR)

## **Some situations where CBR operation may be useful:**

- A net operator needs to be on foot away from the mobile rig.
- A parked mobile station configured as a CBR and located on high ground (i.e. parking garage) can be used to provide wider coverage either simplex or through a repeater.
- Using a low-power HT, an operator located deep within a building can operate through a mobile CBR in the parking lot to communicate with the repeater (i.e. Shelter Operations).



# Crossband Repeaters (CBR)

**When choosing a radio for CBR, be careful!**

## **General Rules:**

- They need to have two frequency displays (typically left and right or top and bottom).
- They need to be able to simultaneously receive both VHF and UHF
- The radio itself must be capable (in software) of CBR

# Crossband Repeaters (CBR)

## **Some radios I know are capable:**

- Yaesu FT8800, FT8900, FTM350, FTM400D
- Icom ID5100, IC2820
- Kenwood V71, D700 and D710
- Alinco DR635T

There are radios back 15-20 years that are capable. I doesn't have to be a new model.

# Crossband Repeaters (CBR)

**The presentation tonight will focus on the Yaesu FT8800/8900.**

- It is the most popular of the radios capable CBR operation
- It's "Hyper Memories" make it quick to change from CBR to Normal Operation
- Come to Fun Day April 29<sup>th</sup> to see other radios such as:
  - Yaesu FTM-400D
  - Icom ID-5100
  - Kenwood TM-D700
  - Or you want to setup or test your radio

# Crossband Repeaters (CBR)

## Good Practices

**Remember:** Our mobiles or portables are NOT continuous duty (as most repeaters) so use lowest power necessary to achieve good communications.

- Saves your car battery
- Saves your mobile from overheating and destroying it
- Part 97 says use lowest power to achieve your communications

**Always** use Tone squelch or Digital coded squelch so noise won't key the CBR!

# Crossband Repeaters (CBR)

## Good Practices

**Stick with *One-Way Cross Band Repeat***, also known as the “range extender mode”, can be used when an HT has insufficient transmit power to bring up a distant repeater during an activation or public service event.

# Crossband Repeaters (CBR)

## Good Practices

### **Remember you FCC Rules in Part 97**

#### **Station Control**

- The FCC requires that a repeater be under the control of an operator who controls the repeater and can intervene in the event of a problem.

#### **Station Identification**

- An unattended station needs to be identified on all frequencies on which it transmits.

# Crossband Repeaters (CBR)

## Good Practices

### **Part 97 Good Practice:**

- CBR's should be used only when needed and never left unattended.
- Make it your practice when identifying remember to:
  - ID your callsign as required
  - Identify that you are using a CBR
  - Give the frequencies you are transmitting on

**In our example, your ID should be something like this:**

“This is WB4ULT operating crossband on 146.43 through the 442.525 repeater.”

# Crossband Repeaters (CBR)

**Any questions before we move on to  
a quick demonstration?**



## **A Demonstration of a “Range Extender” CBR**

In our scenario, we are doing shelter operations at a school. We can hear the repeater output on our HT in the shelter but the net can't hear us (we can't get into the repeater). The Net is using the 442.525 MHz repeater and requires a 103.5 Hz tone.

We have with us a CBR capable mobile, a Yaesu FT8800, in the car and a Dual-band HT such as a Yaesu FT1D, FT2D, IC91, IC92, ID51, VX7 or even a Wouxun.

# Crossband Repeaters (CBR) Demonstration

## Step One

Choose your frequencies and squelch operation

- We will try to access the 442.525 MHz Repeater which requires a tone of 103.5 Hz
- The CBR will use 146.430 (411) simplex (No Offset) as the input frequency

# Crossband Repeaters (CBR) Demonstration

## Step Two

Set up your mobile transmit, receive, power and squelch options

VHF Rx	146.430	No Offset	DPL 411
UHF Tx	447.525	No Offset	Tone 103.5

Tx Power: Set to lowest power to establish good comms.

Low or Mid Power on UHF and Low power on VHF

**Remember:** Duty cycle of the mobile and car battery life

# Crossband Repeaters (CBR) Demonstration



# Crossband Repeaters (CBR) Demonstration

## Step Three

Set up your portable transmit, receive, power and squelch options

- VHF Tx      146.430      No Offset      DPL 411
- UHF Rx      442.525      No Offset      Tone 103.5 Hz

**Op Note:** If you don't set your radio to mute when you transmit, you may get audio feedback because the HT is capable of full duplex crossband.

Most are set to mute as a default, but just be aware.

# Crossband Repeaters (CBR)



# Crossband Repeaters (CBR) Demonstration

## Step Four

Set the FT8900/8800 into Cross-Band Operation

**Double check the frequencies, offset and Tone/DSQ setup (previous slide)**

**Once your frequencies are set in the radio, do the following:**

- Press the **[SET]** key momentarily
- Rotate the “*Main*” knob to select Menu **#44 (X-Rpt)**
- Press the “*Main*” knob dial momentarily, “**XTART**” will appear on the display
- Press the “*Main*” knob dial momentarily to activate cross-band repeater mode
- To exit the cross-band repeater mode, press the **[SET]** key again

# Crossband Repeaters (CBR)

## Final Thoughts:

**If you have a radio that is CBR capable, try it out!**

It's another tool you can add to your toolbox

You never know when it might be needed

**I suggest you try simplex frequencies before you move to repeaters**

**Check YouTube for videos on your radio**

**I have instructions available for the following radios**

Yaesu FT8800/8900

Kenwood D700

Yaesu FTM400D

Icom ID5100



# Crossband Repeaters (CBR)

**This concludes our presentation on  
Crossband Repeaters**

**Any Questions?**