

Cross Band Repeaters

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Topics

1. **What is a cross-band repeater?**
2. **Why use a cross-band repeater?**
3. **Basic Setup**
4. **Keeping it Legal**
5. **Some Practical Considerations**
6. **Demo**



Cross Band Repeaters

Adapted with permission from Santa Clara County ARES/RACES

What is cross-band repeating?

- A feature included in some dual-band, dual-receive radios
- Retransmits on one band what is received on another at the same time



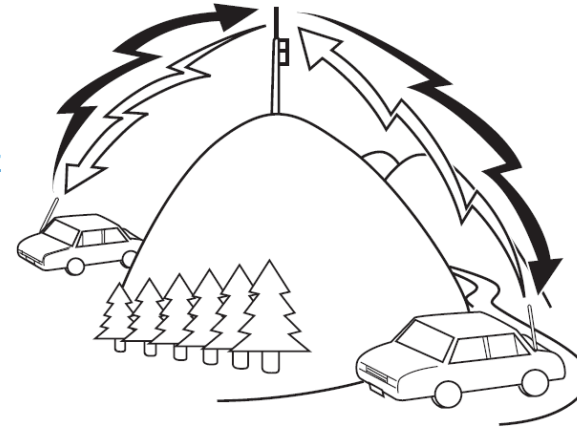
How is it different from a repeater?

Cross Band Repeaters

Normal repeater operation

The transmit and receive frequencies are different, but common for all repeater users.

TX: 144.725 MHz
TX tone: 88.5 Hz
RX: 145.325 MHz



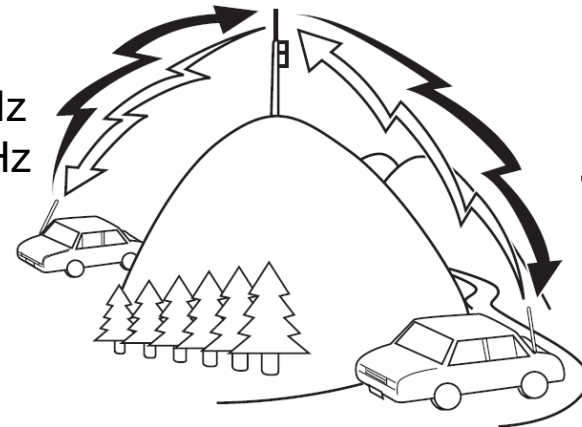
TX: 144.725 MHz
TX tone: 88.5 Hz
RX: 145.325 MHz

Cross-band repeater operation

One station transmits and receives on one band using one frequency

The other station transmits and receives on a different band, using one frequency.

TX: 147.570 MHz
RX: 147.570 MHz



TX: 446.500 MHz
RX: 446.500 MHz



Cross Band Repeaters

Why not just use a regular repeater?

- A cross-band repeater is a lot less expensive than a conventional repeater
- One antenna
- Quick and easy setup
- No frequency coordination issues (uses simplex channels)
- Can be mobile and portable



Why use a crossband repeater?

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1. Increase Coverage

- A mobile/portable cross-band repeater is set up on high ground.
- Multiple HTs/mobiles can communicating through cross-band repeater.

2. Mobility – typical scenario

- A mobile/portable cross-band repeater is set up in a parking lot with a high-gain antenna and medium/high power operation.
- HT on ultra-low power, communicating through a cross-band repeater to an ICP or EOC when it could not go direct. The operator is free to walk around.

3. Increase Battery Life

- At 5 watts, HTs may go through 2-4 battery packs in a shift.
- Recharging 2-4 battery packs over night can be difficult, especially if the battery is charged in the HT.
- Operating at ½ watt can handle a full shift on one battery.



Basic setup – simplex/simplex

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HT1

← 2 meter simplex →



Dual Band/Dual Receive
Radio set up in Cross Band

← 70cm (440) simplex →



HT2

HT1 setup

1. Set to 147.570Mhz Simplex

Cross-band Repeater setup

1. Pick your 2 frequencies, one in each band
2. Set up Channel 1 to 147.570Mhz simplex
3. Set up Channel 2 to 446.500Mhz simplex
4. Enable cross-band repeat on the radio

HT2 setup

1. Set to 446.500Mhz Simplex



Basic setup – simplex/repeater

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HT1 setup

1. Set to 147.570Mhz Simplex

Cross-band Repeater setup

1. Set up Channel 1 to 147.570Mhz simplex
2. Set up Channel 2 to 440.150Mhz, + offset, PL=100.0
3. Enable cross-band repeat on the radio

HT2 setup

1. Set to 440.150Mhz, + offset, PL=100.0



Keeping it legal

Cross Band Repeaters

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What does the FCC say?

97.119 Station Identification

Each amateur Station ... must transmit its assigned call sign on its transmitting channel... at least every 10 minutes... No station may transmit unidentified communications or signals...

97.201 Auxiliary Station

- (a) Any amateur station licensed to a holder of a Technician, General, Advanced, or Amateur Extra Class operator license may be an auxiliary station...
- (b) An auxiliary station may only transmit on 2 meters and shorter wavelengths except... [specific 2 meter, 220, and 440 frequency citations].
- (c) When an auxiliary station causes harmful interference to another auxiliary station, the licensees are equally and fully responsible for resolving the interference...
- (d) An auxiliary station may be automatically controlled.
- (e) An auxiliary station may transmit one-way communications



Keeping it legal

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- Technically: a cross-band repeater is not a “repeater”... it is officially considered a remote base station, so it follows the Auxiliary Station rules.
- Input is considered control and voice uplink, therefore must comply with 97.201.
- The operator must be able to control the station.
- If the operator is remote, then a 3 minute timer must be used.
- Must identify on ALL frequencies every 10 minutes or at the end of the transmissions.



Keeping it legal

Cross Band Repeaters

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- The control operator must identify every 10 minutes. For instance, if I set up up a cross-band repeater using the call sign K6KP (CARES Call Sign),

“This is K6KP, cross-band”

- Another way to handle this is for every operator using the cross-band repeater to ID themselves and the cross-band repeater with every transmission. For the setup as above, KK6EWQ would ID as:

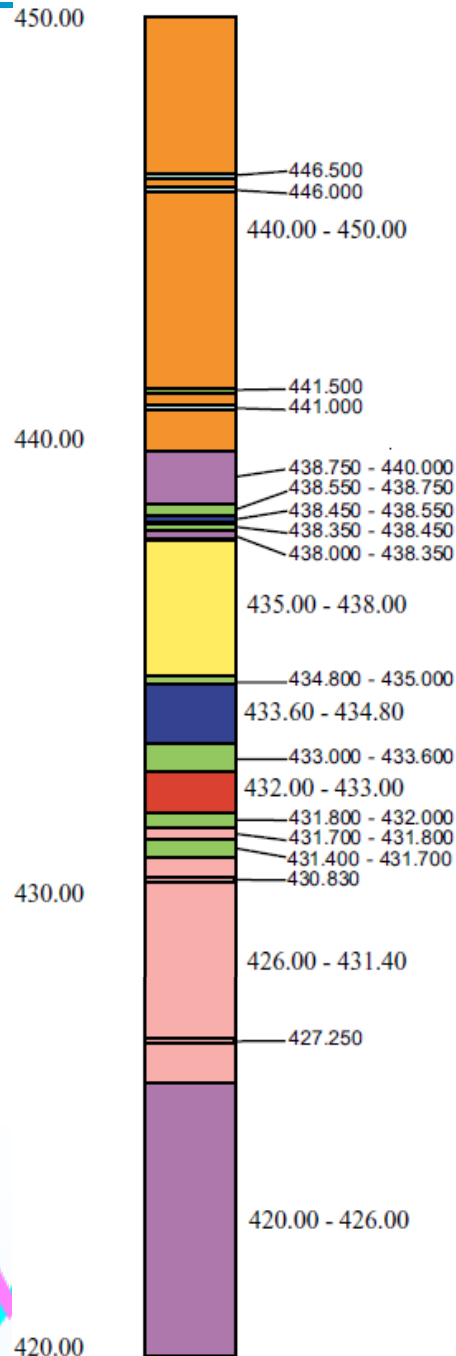
“KK6EWQ on K6KP, cross-band”

- Some mobile radios will ID themselves using CW. When you set up the radio as cross-band repeater, you give it the call sign it should use. Some Kenwood radios do this, including the TM-V71s in the CARES Alternate Response Plan equipment.

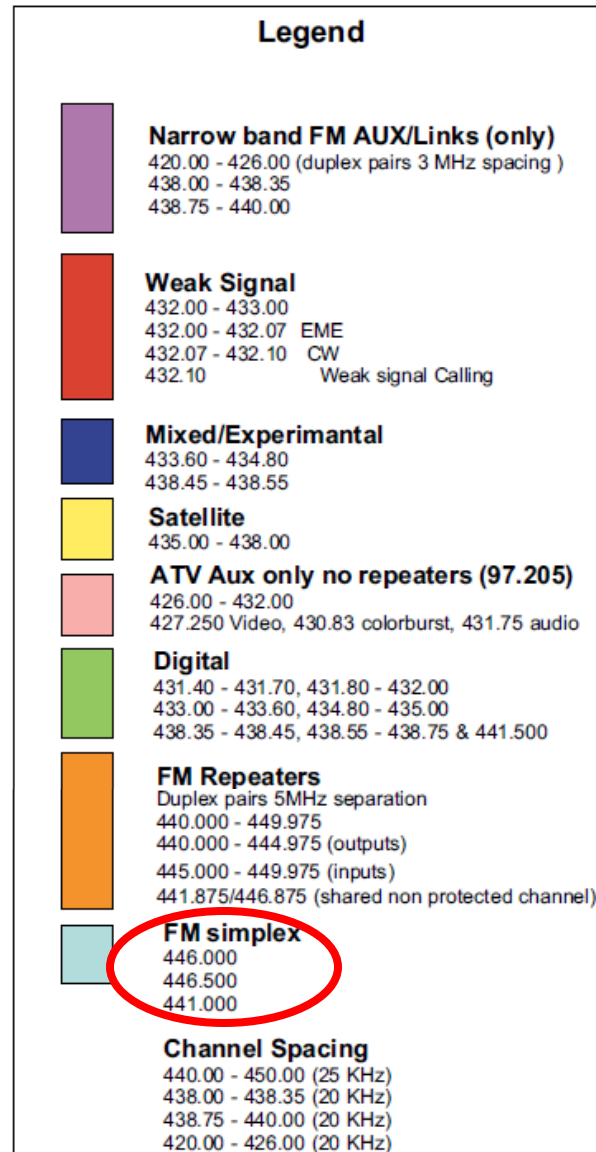


Practical Considerations - 440 Band Plan

<http://www.narcc.org/>



Northern California 70 cm Band Plan



Contact information

For Repeater coordination in Northern California
Contact: NARCC
www.narcc.org

For weak signal information
Contact Western States weak signal society
www.wswss.org

For Amateur satellite information
Contact: AMSAT
www.amsat.org



Practical Considerations

Cross Band Repeaters

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- A cross-band repeater may spend a lot of time transmitting.
 - It could use a lot of battery power.
 - It could overheat if it's transmitting a high power
- A cross-band repeater with a high-gain antenna may pick up signals you don't want.
 - Set tone squelch on the cross-band repeater, requiring users to transmit a PL tone, just as regular repeaters do.



Demo - Kenwood TM-V71

Set the frequency you want on each side of the radio

- 147.585
- 441.000

Configure the radio for cross-band repeater operation

- Set menu 403 (RPT.MOD) to “CROSS”
- Set menu 406 (ID.TX) to “MORSE”
- Set menu 405 (RPT.ID) to “K6KP”

Turn on cross-band repeater operation

- Turn the radio off
- Hold the TONE key while turning the radio on



Thank you

Any Questions?

