

Cross-band Repeating

Benefits, limitations and proper
methods to set up and use a cross band
repeater

MONTGOMERY AMATEUR RADIO CLUB

TACTICAL REPEATER COMMITTEE

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Portions adapted with permission from Santa Clara County ARES/RACES

and the EMERGENCY MEASURES RADIO GROUP – Ottawa ARES

A repeater receives a signal and re-broadcasts it

- On the same frequency with a delay
 - **Digipeater** (e.g., APRS),
 - **Simplex voice repeater**
- On the same band, simultaneously, but different frequency
 - **In Band Repeater** like KV3B 146.955 repeater
- On a different band
 - **Cross-band repeater**

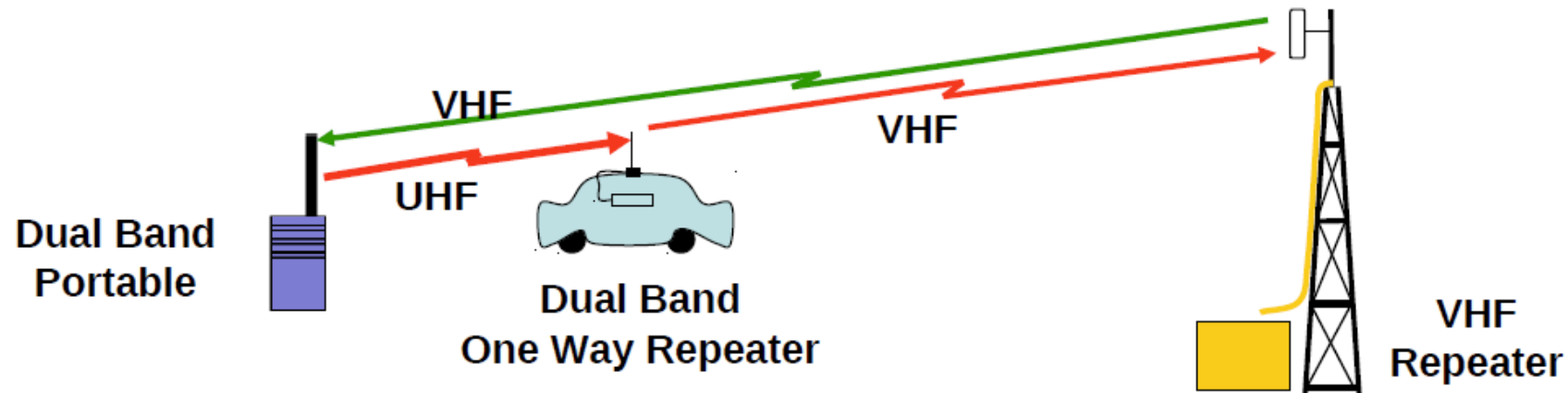
A Cross Band Repeater

- Transmit & Receive are in different bands, typically VHF and UHF
- Supports **One Way Repeat** (uni-directional) or **Two Way Repeat** (bi-directional) repeating
- Quick and easy to set up. Many mobile radios have cross band repeat capabilities or simply PC controls

One Way Repeat

(Uni-Directional)

One way repeating used when the portable radio can hear the repeater, but cannot transmit back due to distance, buildings or lower power.



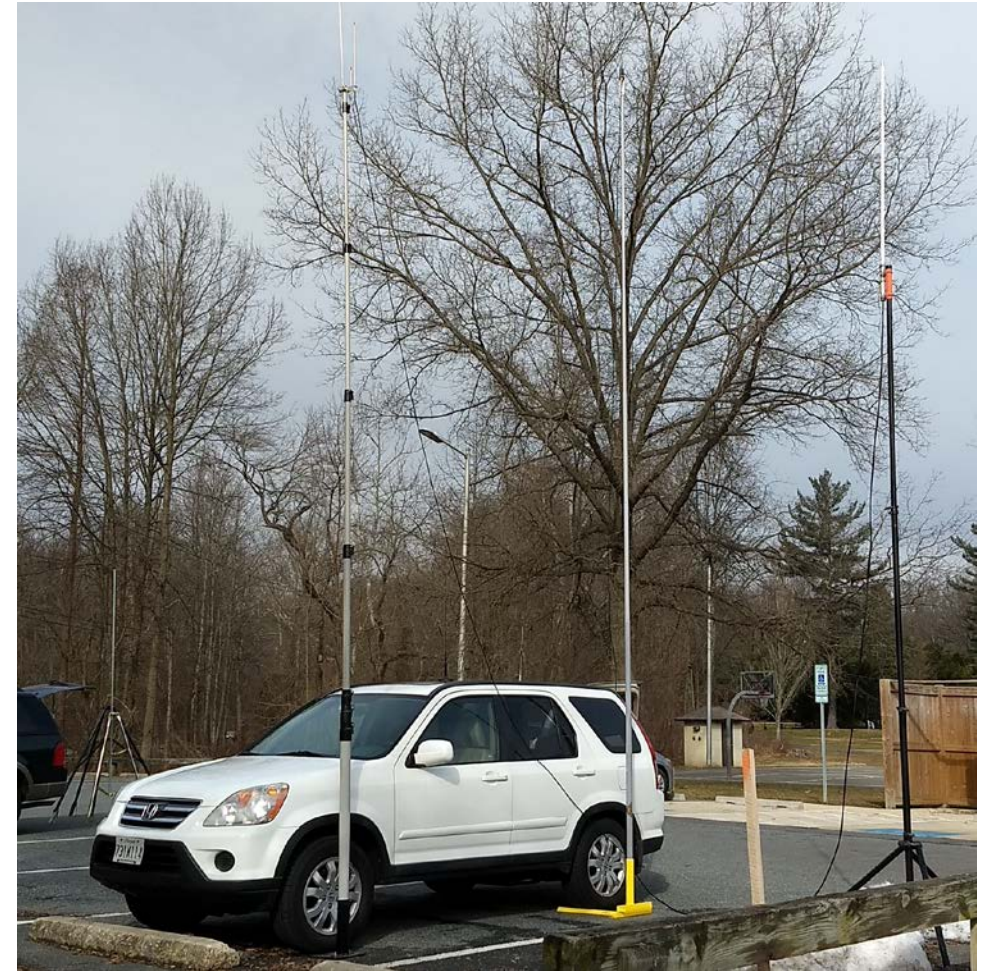
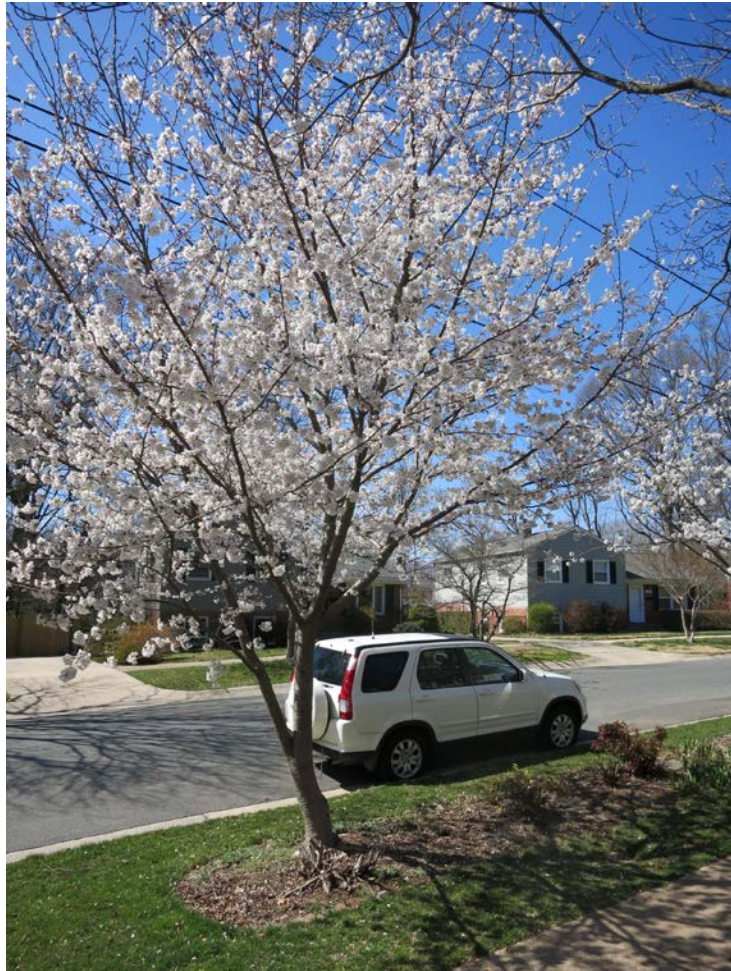
One Way Repeater receives from the portable radio on a simplex frequency on another band, and transmits to the repeater on the repeater input frequency

One Way Repeat Field Use Example



What's a One Way Repeat look like?

(Uni-Directional)



One Way Repeat (Uni-Directional)

Requires compatible HT – one that can transmit on one band and receive on another

- Non-standard repeater split – e.g. Yaesu FT-60 FT-70



- Dual receiver – e.g. Kenwood TH-D74

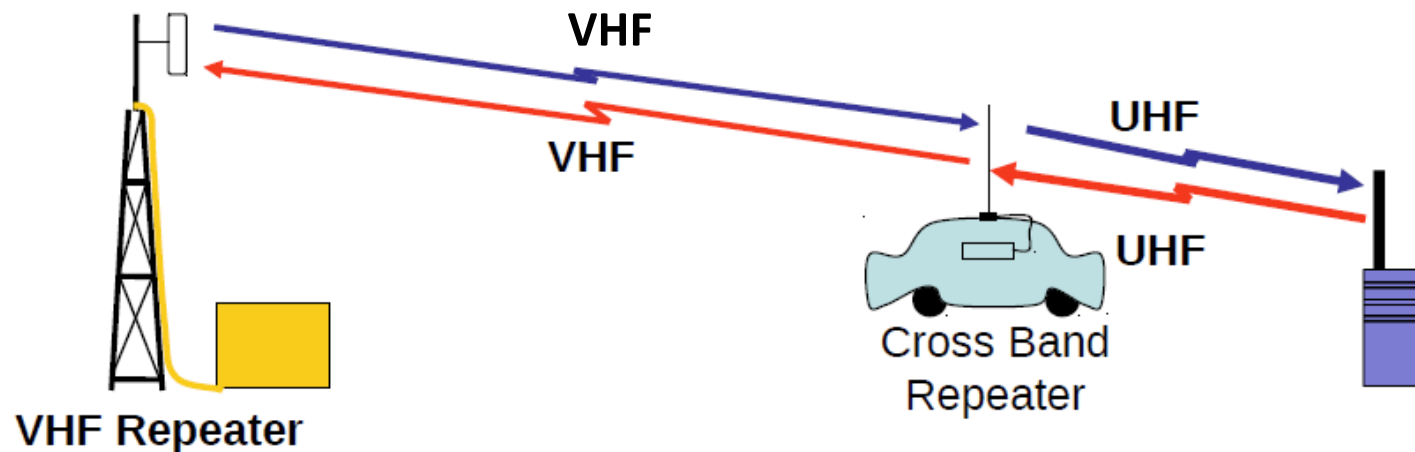


- Both – e.g. Yaesu FT3D



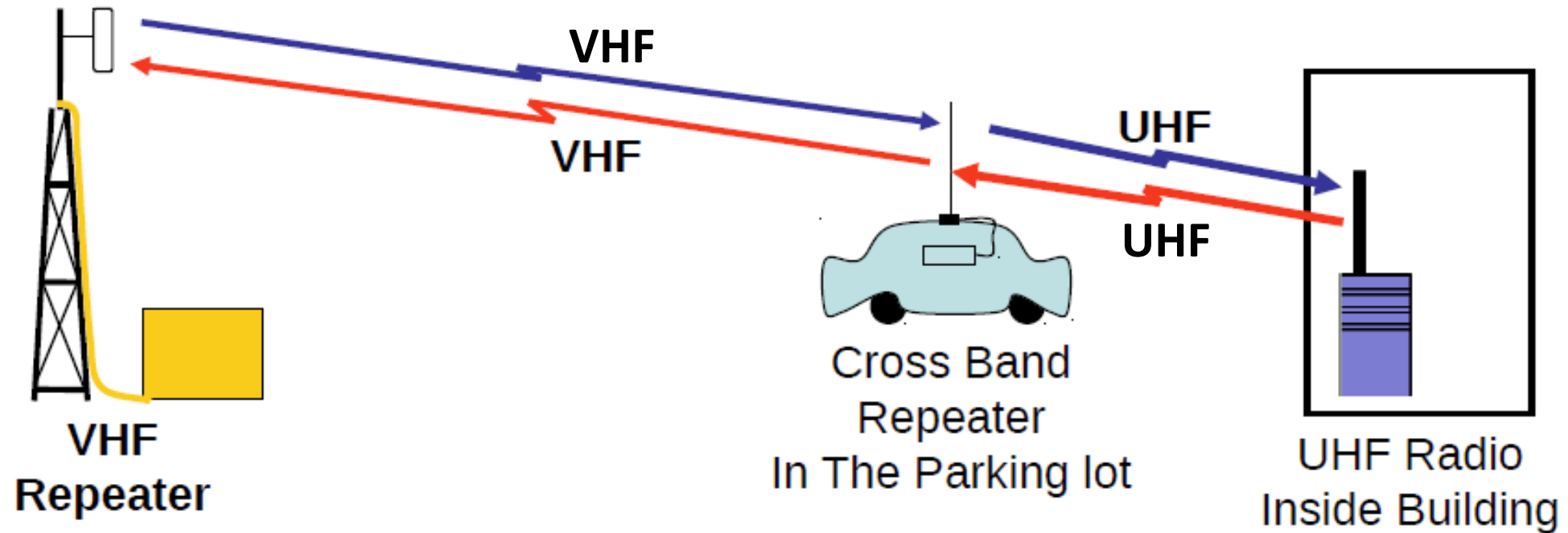
Two Way Repeat (Bi-Directional)

- Bi-directional repeating used when portable radio cannot receive the repeater reliably, AND cannot transmit back to the repeater due to distance, buildings, lower power.
- Portable radio transmits and receives on simplex frequency to cross band repeater and cross band repeater transmits and receives on repeater frequencies.



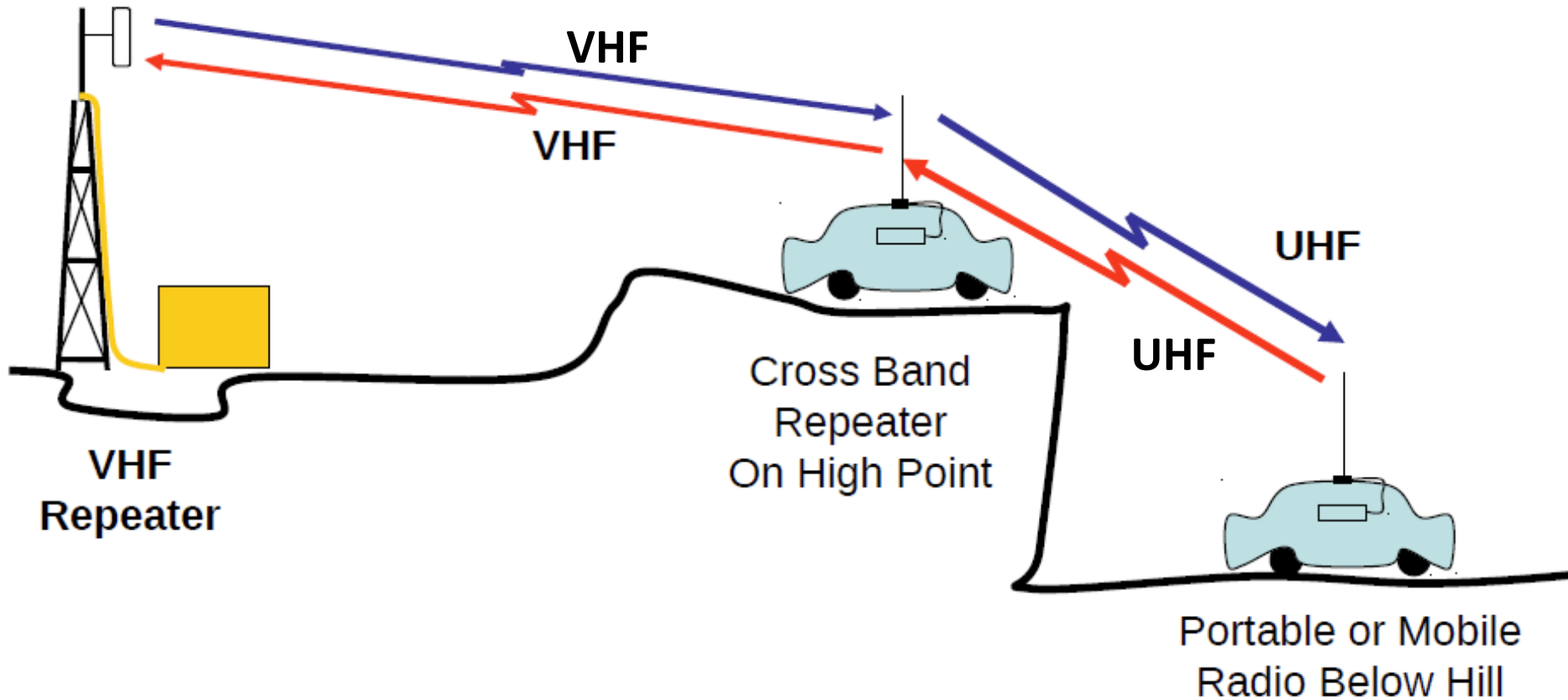
Two Way Repeat (Bi-Directional)

In Building



Two Way Repeat (Bi-Directional)

Extended Coverage – Terrain

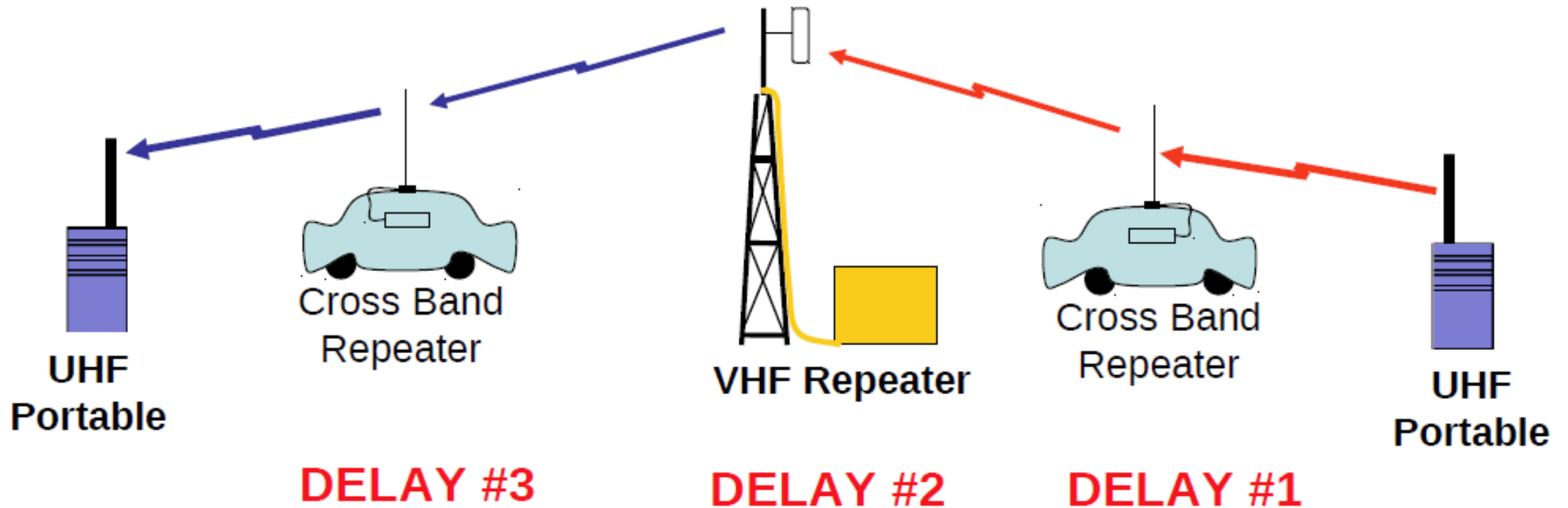


Issues

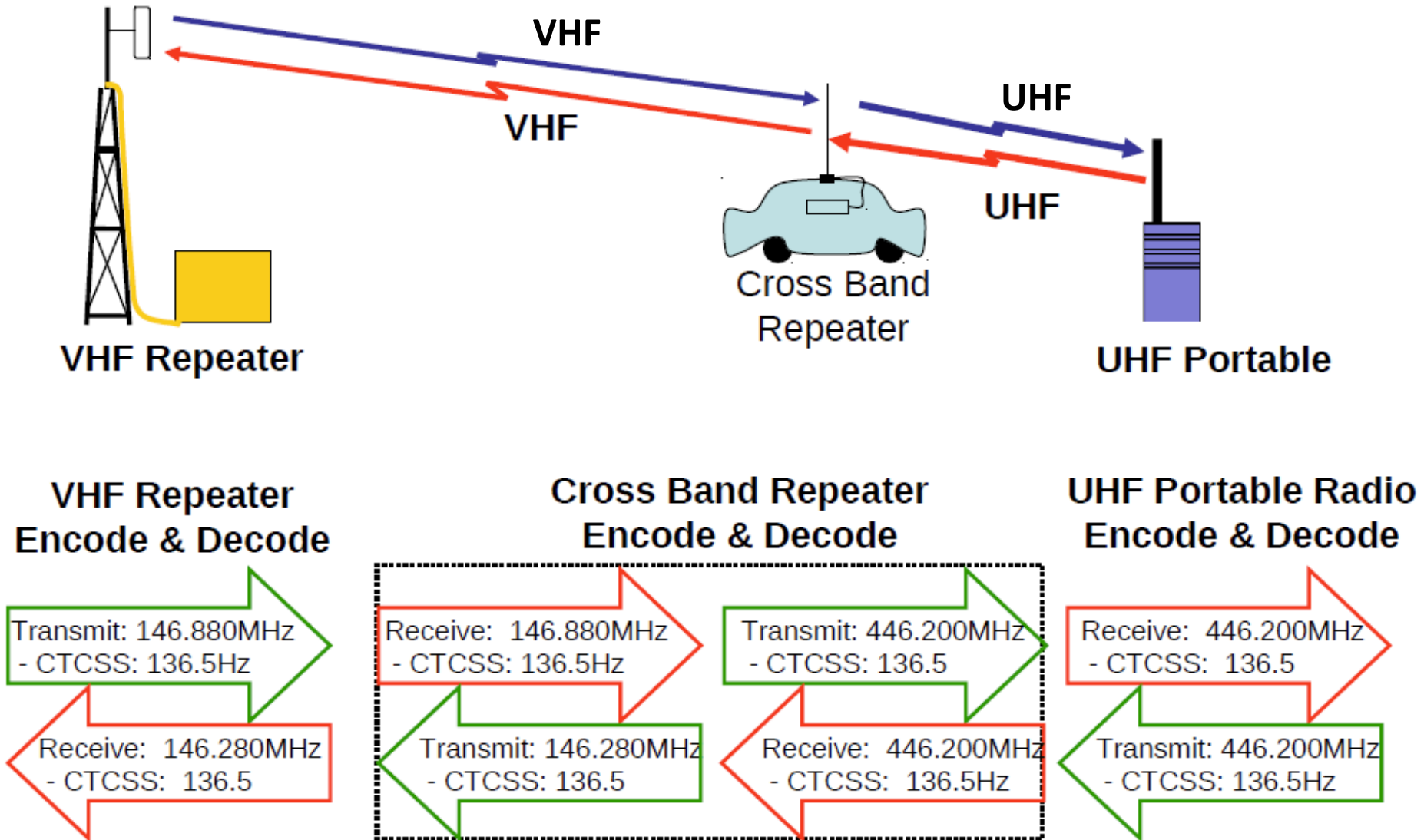
- Only one direction at a time (Two Way Repeat).
- Cross band repeater will continue transmitting until the repeater tail drops.
- Allow time for delays (push PTT – wait 2 seconds – talk).
- Mobile radios used for Cross Band Repeaters are not designed for long periods of transmitting. Use reduced power.
- Always configure Tone Squelch on the input of your cross-band repeater to avoid unintended transmissions on the output frequency.
- FCC call sign identification. Not an issue on a One Way Repeat. Some radios will transmit CW ID.

Delays

- If two stations are using cross band repeaters and they are talking through a repeater, the delay can be significant, so **ALL** operators need to wait before they speak.



CTCSS Cross Band Example



Extend Simplex Range

- Cross Band repeaters can be used back to back to extend the range of simplex communications.
- Using separate transmit and receive antennas on the cross band repeaters would allow a VHF beam to extend distance



Partial list of Cross-band Capable Radios

- Yaesu- **FT8800**, FT8900, FTM 350, **FTM400**
- Kenwood- **TM D710**, TM D700, **TM V71A**, TS 2000
- ICOM- IC 2730, W32a
- ADI- AT-600
- Alinco- DR635

List of radios with auto ID: **TM D710**, **TM V71A**, TS2000

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QUESTIONS?