APRS Overview

What is it?
Why would I use it?
How do I get started?

https://bit.ly/DRU2511

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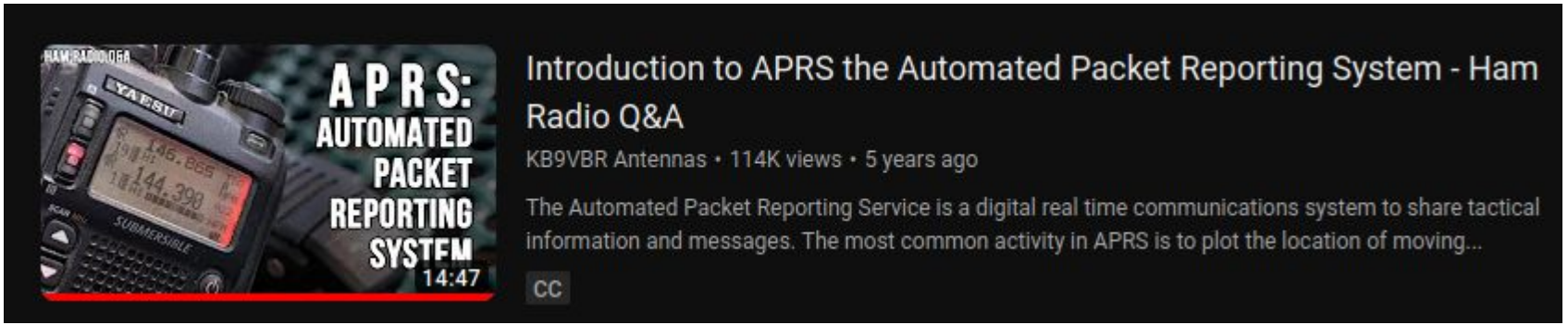
KC3DRU

April 2024
November 2025

What is APRS?

- KB9VBR Intro to APRS video - pre-meeting “homework”. https://youtu.be/xQFSmINZqCY?si=Lrna0SCHKKseX2DK



What is APRS?

- **A**utomatic **P**acket **R**eporting **S**ystem
- Created by **Bob Bruninga (WB4APR)** in the 1980's
- Short data packet bursts that broadcast and repeat data via RF
- Data can be general information e.g. station status, telemetry, or current weather
- Packets can also be directed to a specific station, a group of operators, or to a data service.
- Messages always include sender's location, callsign, and packet duration (**Path**)

What is APRS?

- Individual radios for a station are identified by a Secondary Station ID (**SSID**)
  e.g.: KC3DRU**-7** KC3DRU**-9**
- **Digipeaters** are stations that listen for packets and then re-broadcast them to help propagate packets
- **IGate** stations listen for RF packets and then routes them through the APRS-Internet-System (**APRS-IS**).
- If an IGATE receives an APRS-IS packet for a station it has heard **beacon**, it will transmit that packet over RF

- All VHF-FM APRS traffic in US is on **144.390 MHz**

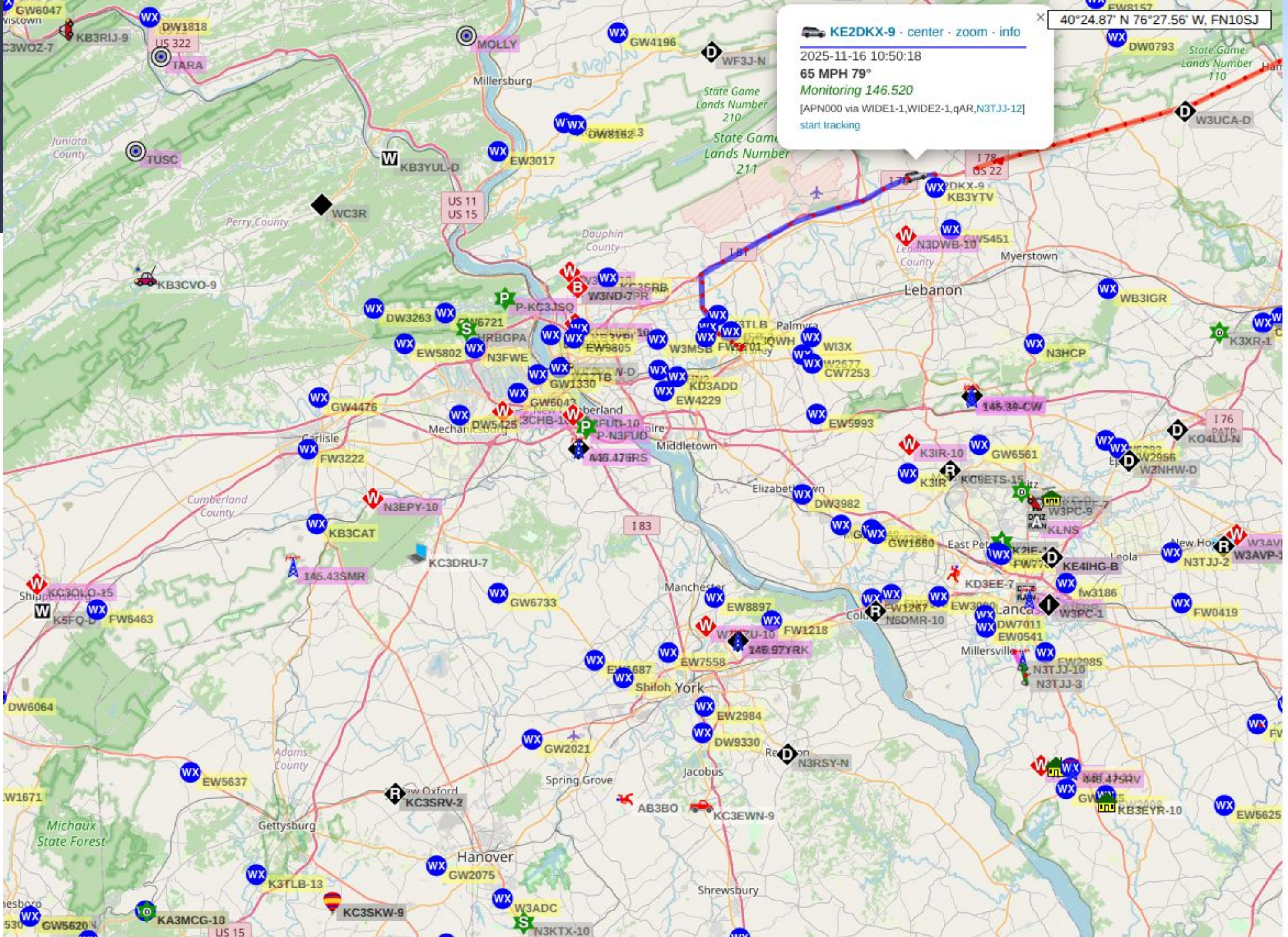
Uses for APRS

- Current position reports. Usually integrated with GPS data to get real-time location.
- Fixed stations can just broadcast a static location with status info e.g. club meeting info
- Short text messages to another operator.
- Beacon messages to indicate the station’s current status and listening frequency
- Balloon tracking (WA3USG presentation from 2023)

Uses for APRS

- Weather measurement (ham's post weather station values on APRS)
- Get weather forecast for your current location
- Spot yourself at a POTA / SOTA
- Send brief email (APRS to WinLink)
- Send / receive SMS (cell phone text) messages. (Note: ***SMSGTE*** is currently off-line due to government intervention "**SMS**" is available must opt-in to receive texts)

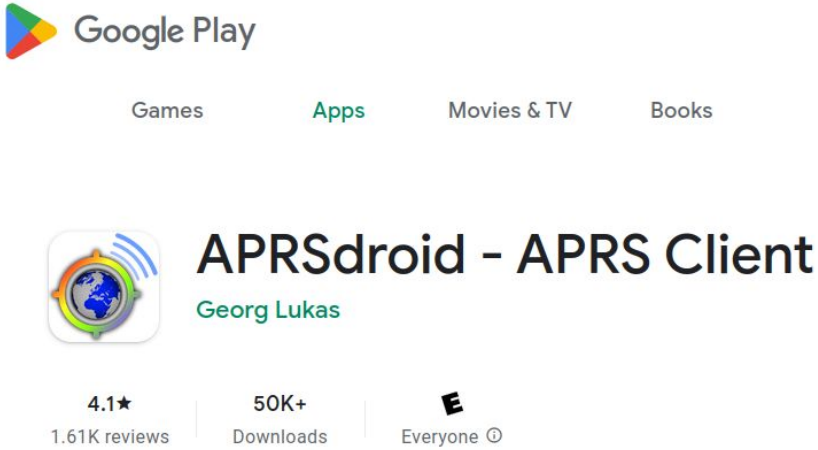
Our Area



40°24.87' N 76°27.56' W, FN10SJ
KE2DKX-9 · center · zoom · info
2025-11-16 10:50:18
65 MPH 79°
Monitoring 146.520
[APN000 via WIDE1-1,WIDE2-1,qAR,N3TJJ-12]
start tracking
Millersburg
Juniata County
Perry County
Dauphin County
Lebanon County
Lebanon
Myerstown
Palmyra
Carlisle
Mechanicsburg
Middletown
Elizabethtown
Cumberland County
Manchester
York
Shiloh
Millersville
Spring Grove
Jacobus
Adams County
Gettysburg
Hanover
Shrewsbury
Michaux State Forest
State Game Lands Number 210
State Game Lands Number 211
State Game Lands Number 110

Getting Started with APRS ($)

- Cell phone, APRS Cable, & a Baofeng UV5R
- App pulls location from phone's GPS
- Set radio to VOX mode
- Use the phone's on-screen keyboard
- FLAKEY RESULTS

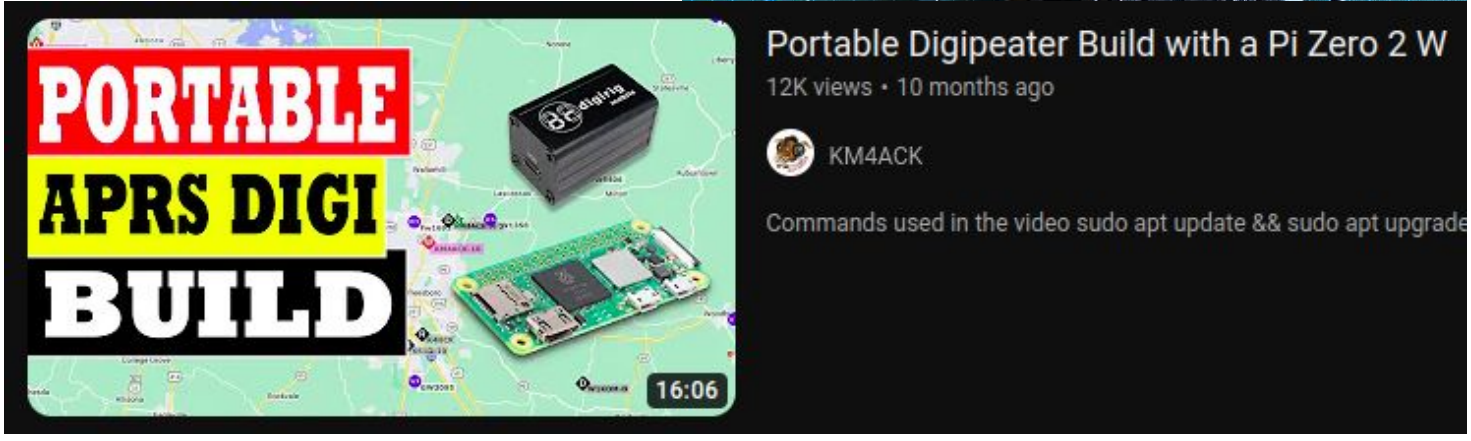


- I've had hit or miss success with this
- Sometimes it sends
- Sometimes it decodes
- Make sure to turn off phone notifications so they don't trigger VOX.

Getting Started with APRS ($$)

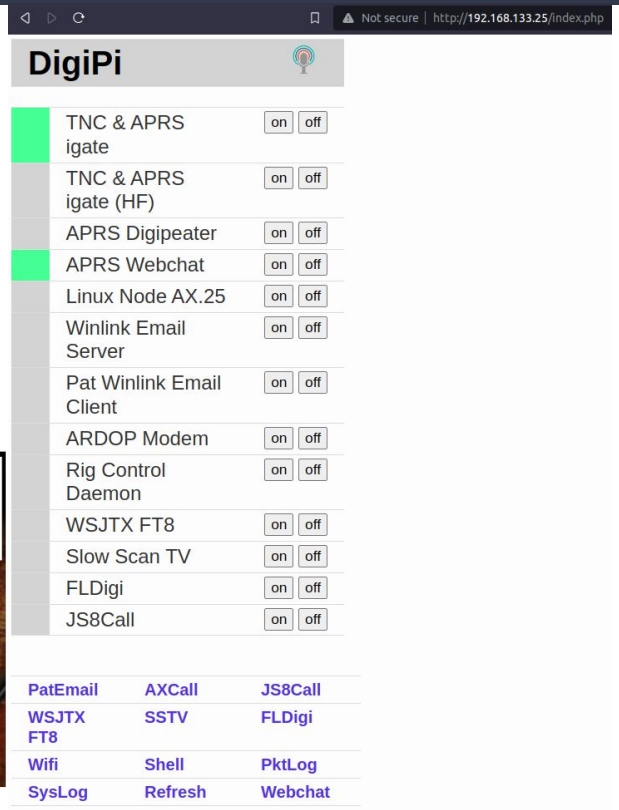
- Build a **DigiPeater**
- Computer (Laptop or Pi)
- **DigiRig** sound card interface
- Cable for DigiRig-to-Radio
- Follow Jason's video
- Add **YAAC** for a user-interface to send messages, see stations on a map, receive messages.
- Uses "**DireWolf**" to control radio and handle APRS decoding.

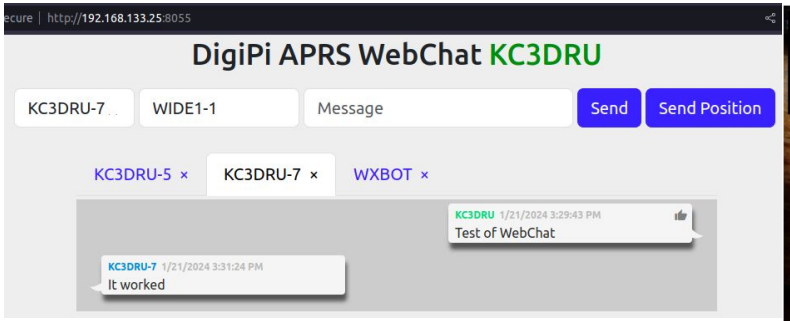
https://www.youtube.com/watch?v=TCpt6NY1kew

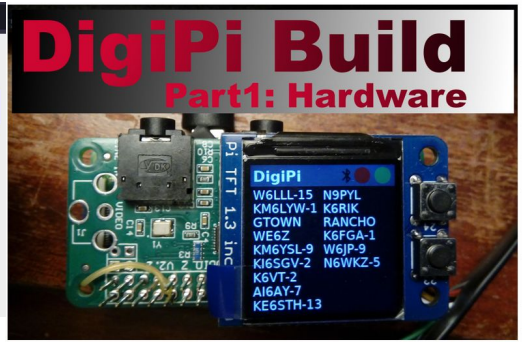


Getting Started with APRS ($$)

- Build a **DigiPi** Project (**KM6LYW**) https://digipi.org/
- Based on a Raspberry Pi - Any model?
- Can build a custom PTT header board (Plans on site) better yet, All-In-One-Cable https://na6d.com/products/aioc-ham-radio-all-in-one-cable
- “Webify” the Pi experience.
- Use a browser (phone / laptop / etc) to control the Pi using a web page.
- Click a button to enable programs / capabilities
- Tried using Pi Zero 2W with DigiRig but ran into stability problems - too much current draw for Pi Zero? Works well with Pi 4.
- Has a handy APRS “**WebChat**” feature (**APRSd**)
- His DireWolf instance limits traffic to just your callsign.





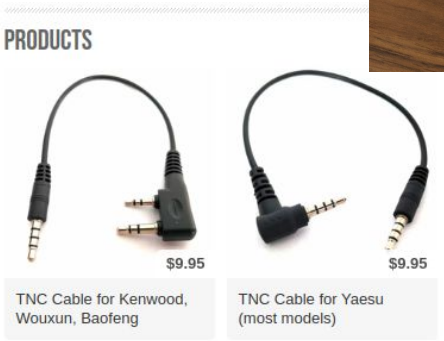


Getting Started with APRS ($$$)

- Still use **APRSDroid** on the phone
- TNC (Terminal Node Controller) has Bluetooth connection to phone / tablet (No cell service required)
- Buy cable to match your radio
- Fewer cables to mess with
- Radio can be placed in better location
- Allows other functionality (via TNC) e.g. WoAD (Winlink)

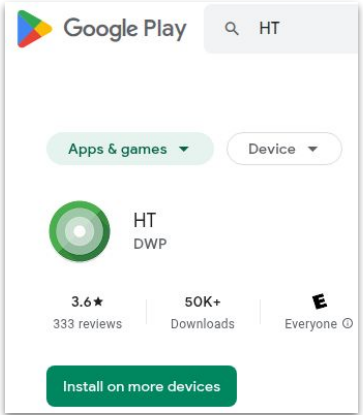
Mobilinkd

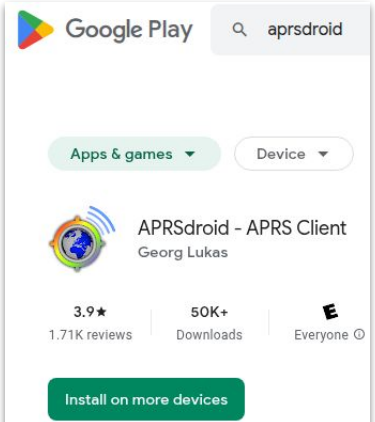
HOME CATALOG BLOG ABOUT US

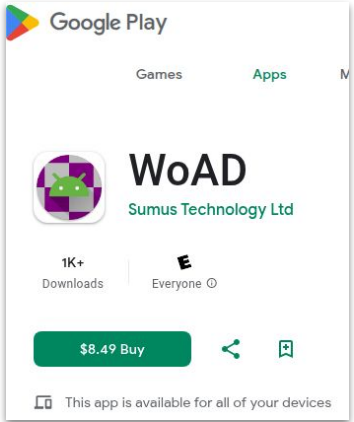


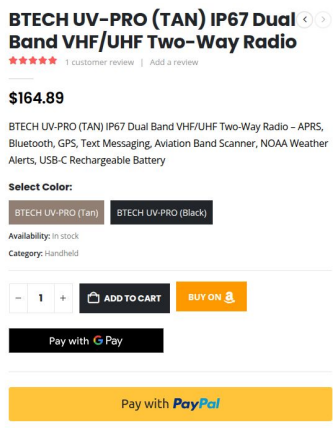
Getting Started with APRS ($$$) (Sweet spot)

- BTech UV-PRO (also Vero VGC-N76) radios have BlueTooth connectivity to your cell phone
- Android app “HT” controls the radio for programming. (Kind of buggy though)
- Android app can Tx/Rx APRS packets and beacons
- You can also use the BT connection to run APRSDroid (APRS) or WoAD (Winlink on Android Device radio-email)







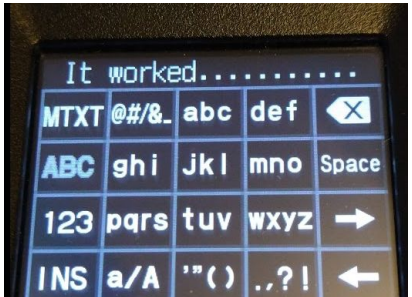


Getting Started with APRS ($$$$)

- Buy a radio with APRS built-in functionality
- More expensive but more reliable
- Dual receivers allow you to talk on A band and beacon APRS on B band.
- HTs: FT-5DR, FT3-DR, some Kenwood HTs
- Mobile units: FTM-400DR, FTM-300DR, FTM-500DR, Kenwood TDM-7x0
- **Avoid ICOM - they use DPRS** (D-Star Packet Reporting System) which requires a D-Star repeater system
- Some radios will send APRS position packets but will not allow you to send / receive custom text messages.
- Cumbersome text entry though - set up / store canned messages

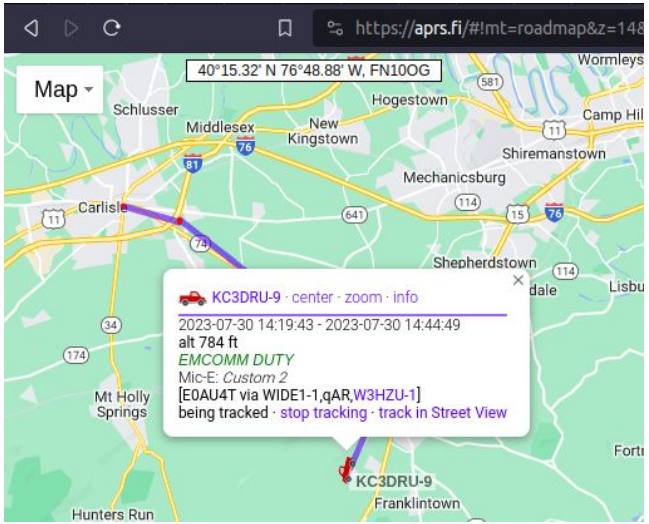
Radios Have a Cumbersome User Interface

- FTM-300DR shown here
- FTM-400DR has on-screen touch keyboard
- FT-5DR has touch screen but multi-letters per “button”
- If you can, set up & store canned messages to reduce “typing”



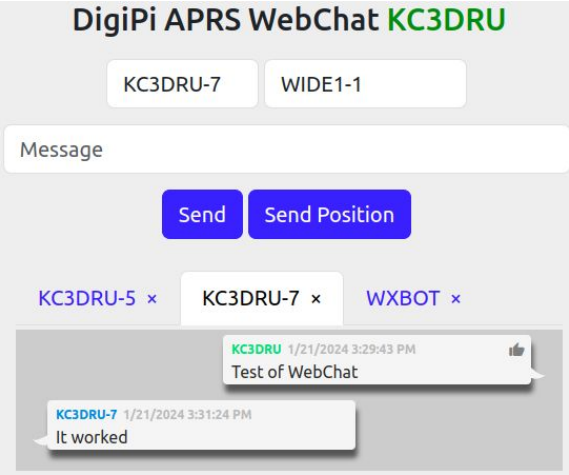
Why Use It?

- Show **your location** when out of cell service. For example when at a bike race. Your “followers” can see you on https://aprs.fi
- Your **Beacon Status Text** can tell others your purpose (here I was beaconing while returning home from a bike race. “EMCOMM DUTY”)
- Can also be used to track other objects or things:
  - Use it to track the “sweep rider” in a bike race.
  - Track a ham radio balloon (WA3USG)



Why Use It?

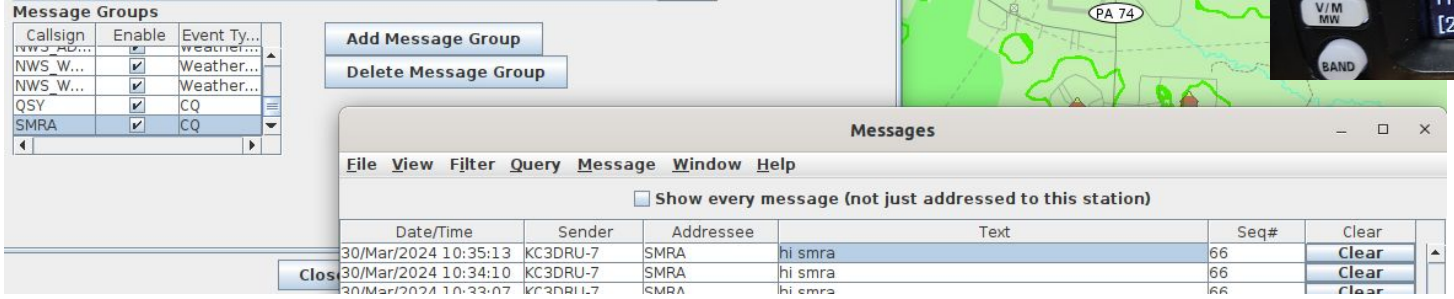
- Send **APRS text messages** to other Operators directly.
- Even though I am sending a one station-id (**-7**) all radios currently on will receive the message because it is sent to my callsign.
- Messages are passed over APRS using DigiPeaters if local or sent via the internet if there is an I-Gate within range.
- An IGate will broadcast over RF if the target station has been heard.
- Thursday is “APRS Day” where operators from around the world hop on APRS to send messages. https://aprsph.net/aprsthursday/



Why Use It?

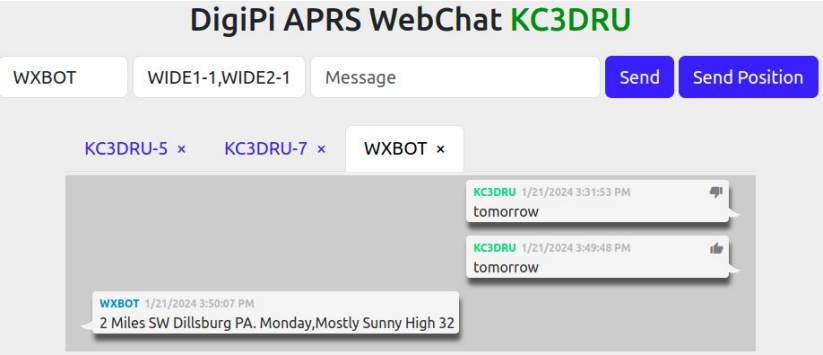
- You can also send messages to a **Group of operators**.
- I added the group "**SMRA**" to both the FTM-300DR and FT-5DR so any messages to the group show up on the radio.
- It can also be added to YAAC on the "Message Groups" list.
- A message sent to "**SMRA**" now shows up on all radios/devices that are monitoring that group.

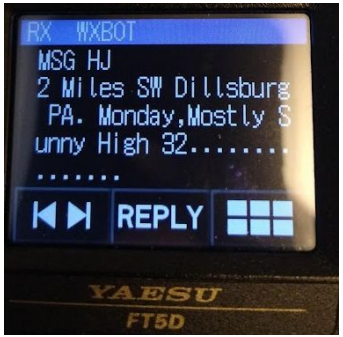
Group Messaging: https://www.youtube.com/watch?v=9Yw0YvzuGAk



Why Use It?

- Get custom **Weather Reports**: Send a message to 'WXBOT' it will give you a report based on your current location.
- "WXBOT" is one of several data service providers ("bots") that are available on the APRS system. They respond to requests or perform specific functions for you.





- Some operators put their WX station data on APRS to send out current conditions as general APRS packets. They also show up on APRS.fi

Why Use It?

- Send / Receive **phone SMS text messages** when local phone infrastructure is down by using the **SMS** data service.

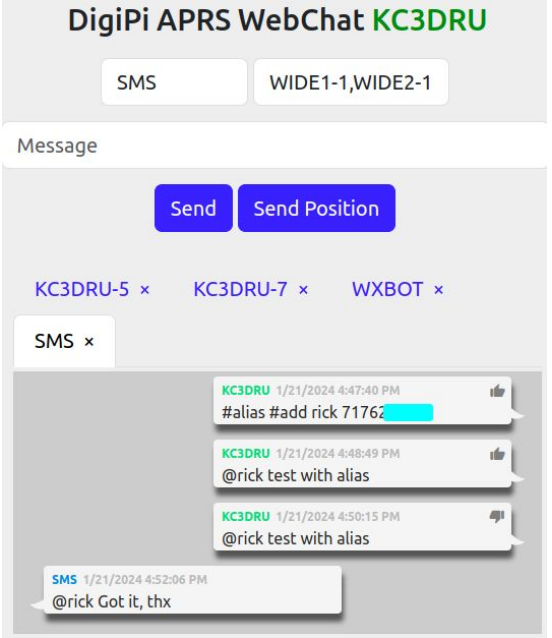
- Cell phone number must “Opt In” to service to prevent SPAM. Opt-in by registering the cell # at this site: http://aprs.wiki/SMS/

- Create an ALIAS so that your phone number is not in all of the APRS logs. Send a message to `SMS #alias #add rick 7173335555`
- Send a text to the alias like this: `SMS @rick test with alias`

- Address your APRS message to the “**SMS**” service provider and it converts it to a cellular SMS text message.
- The first “word” in the message should either be @youralias or @cellPhoneNo to indicate who should receive the rest of the message text.

- Phone owner can reply back to the message and the SMS data service will forwarded the text to your radio as an APRS message.

- More info on this service: http://aprs.wiki/SMS/howto.html



Why Use It?

- Spot yourself on POTA.app if you don't have cell service.
- The message must be sent to the data service: "**APSPOT**"
- The message must use this format to be forwarded to pota.app. Note the special characters (!), spaces, and decimal in the frequency.
  `! pota US-1356 14.233 ssb`
- Check out this brief video showing how it's done.
  https://www.youtube.com/watch?v=SI_JS0kTcZM

Why Use It?

- The data service **MPAD** (Multi-Purpose APRS Daemon) can answer various information requests.
- Enhanced weather queries:
  - More details for your current location
  - Get local WX reports from APRS wx stations using the CWOP command (Civilian Weather Observation Program)
  - Aviation specific current weather conditions (METAR and TAF reports) (Understanding METAR reports https://www.youtube.com/watch?v=upOgMYGsgog
- Look up repeaters (including access details)near your current location.
- Current location information using Open Street Maps. Find nearest grocery store, gas, emergency services.
- Get satellite (OSCAR) information next pass, freq, etc.
- Video from KM4ACK on MPAD: https://www.youtube.com/watch?v=75W0UTL5eOY
- More commands for using MPAD https://github.com/joergschultzelutter/mpad/blob/master/docs/EXAMPLES.md

Why Use It?

- The setting “**VOICE ALERTS**” tells you when another APRS operator, who is also using voice alerts is within Simplex Range.
  https://www.youtube.com/watch?v=ekIKkSOrdfY&feature=youtu.be

- “**Repeat**” service will reply with nearest N repeaters:
  `REPEAT N 2 2M +ALLSTAR`
  Replies with two nearest 2M repeaters that use AllStar
  https://aprs-repeat.hemna.com/#help

- Get / Send Winlink Email via **APRSLink**. https://winlink.org/APRSLink KM4ACK tutorial
  https://www.youtube.com/watch?v=47OGdmm-jEY

Beyond VHF Range

- What if the local infrastructure is out of service?

- APRS can be done over HF frequencies too!
- Not as many machines on the air though.
- Usually done with FSK packet mode

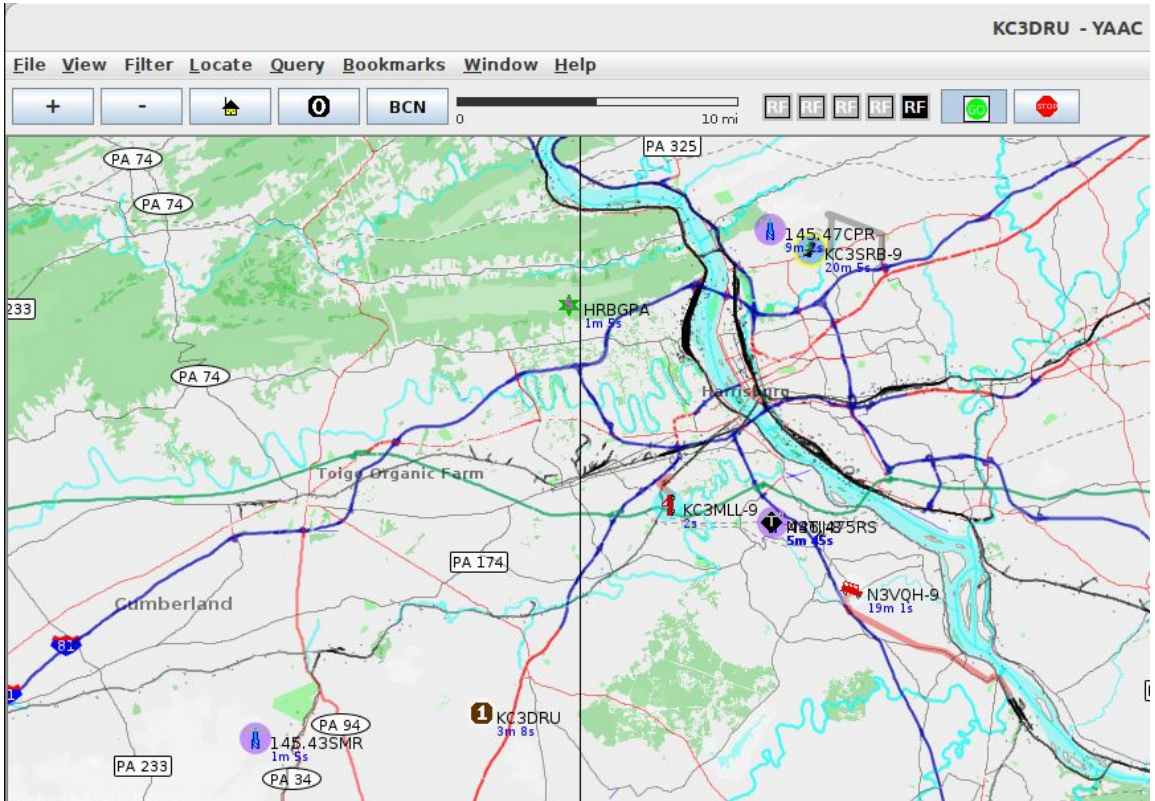
- 40m 7048.600kHz LSB
  30m 10147.600kHz USB
  20m 14103.00kHz LSB

- Some people are experimenting with using VARA to send packets. http://wa8lmf.net/APRS_VARA/

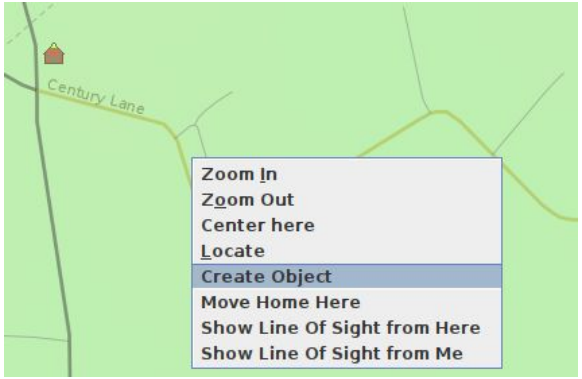
- JS8Call can be used to send HF packets to APRS-IS. https://www.youtube.com/watch?v=dAiXsSMIkKY
- JS8 / APRS Utility: https://www.youtube.com/watch?v=5pbF5h_aCgI

YAAC - Yet Another APRS Client

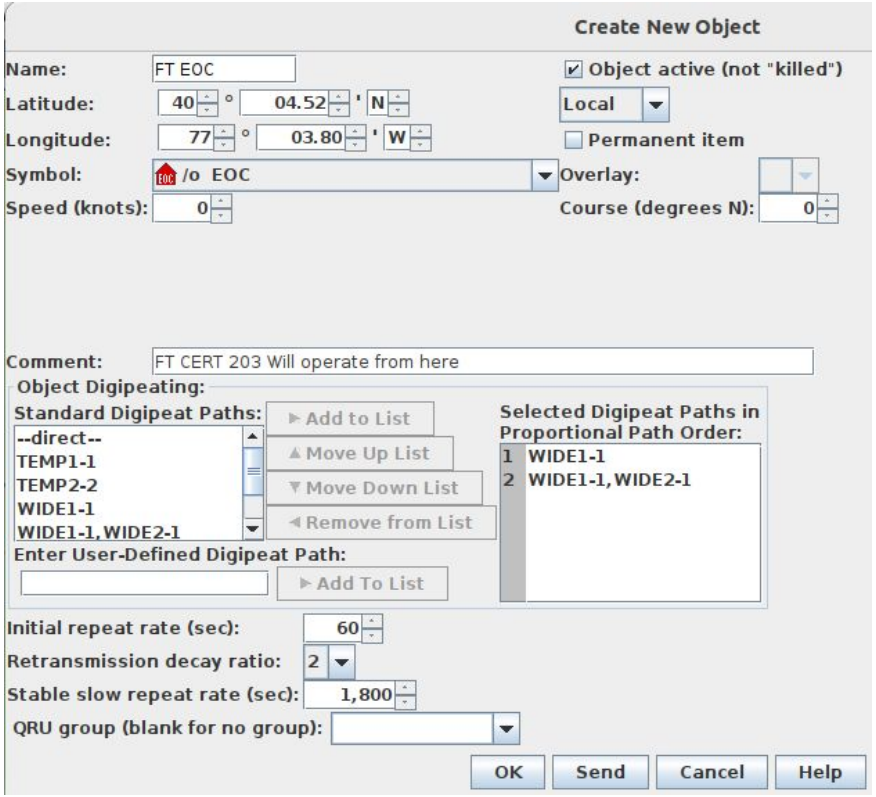
- Shows APRS activity on a map
- Connect to another computer (over WIFI) that is running DireWolf
- Allows you to send / receive messages by using the DireWolf port
- Good for bike rides or public service Events where you need to see where Things are in the area.
- Allows you to add your own markers To the map - can be local or broadcasted

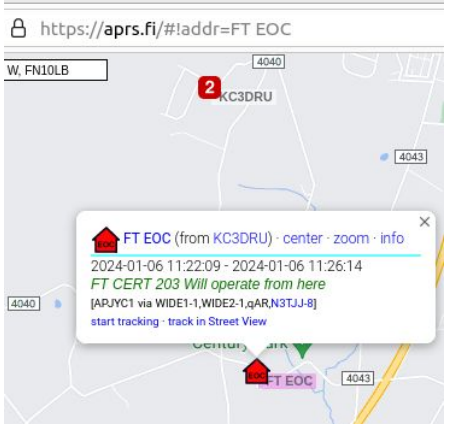


YAAC - Yet Another APRS Client



- Adding the Franklin Township CERT EOC
- Allows other operators to know where the “Base” is located





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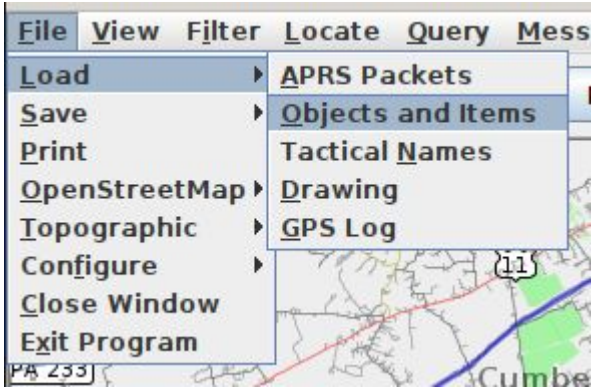
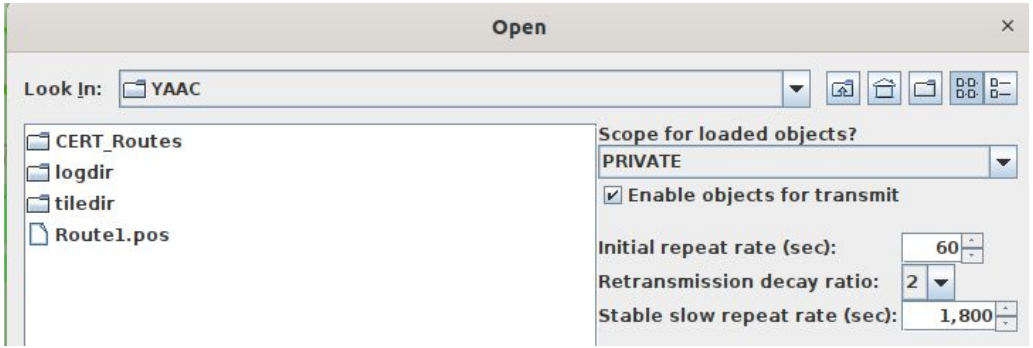
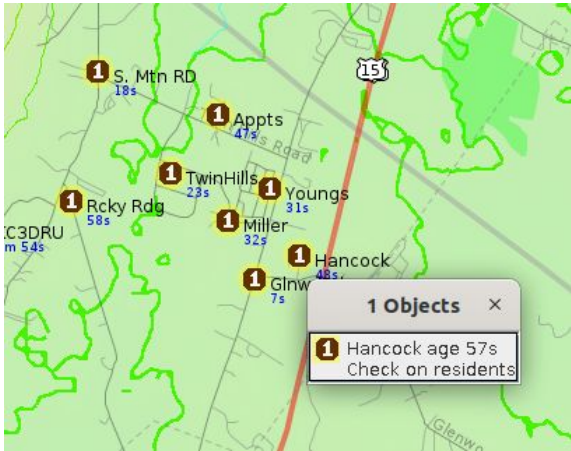


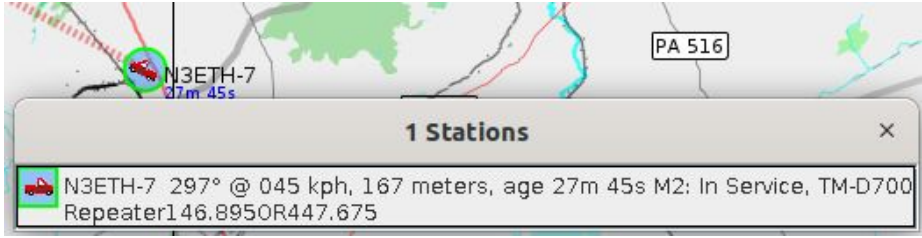


- You can define, save, and then reload map objects.
- Objects can have descriptions.
- This example shows “Driving Route 1” that the FT-CERT team does after a storm. Each “1” marker represents a group of houses to be checked or a key milestone on the driving route.



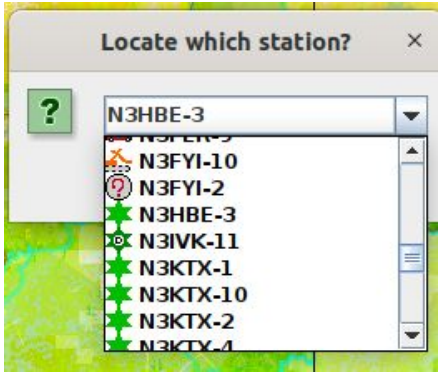
YAAC - Yet Another APRS Client

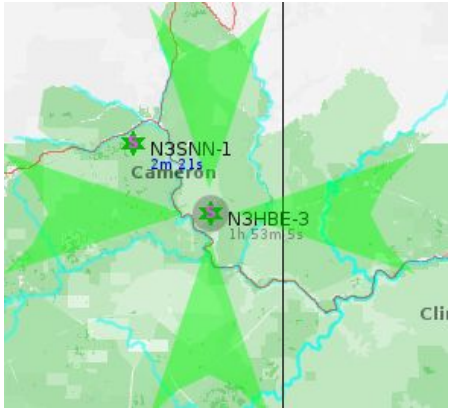
- You can monitor stations that are broadcasting status packets. Ie. are they moving, where have they been, current speed etc.
- Stations can use a special “EMERGENCY” station status that alerts any station hearing the signal.
- Some hams add their weather stations to APRS allowing you to get current conditions near you



YAAC - Yet Another APRS Client

- The “Locate” feature will show you the current location of a given station. Quicker than trying to pick out the station on the map
- Using APRS for community service (KM4ACK) https://www.youtube.com/watch?v=o1prtGPm52A





Post Presentation Additions (Apr. 17 2024)

- Store and Forward APRS (email like) messages:
  - Use the service "`MAIL`" to store a message for a specific callsign-SSID. `MAIL @KC3DRU-7 THIS IS A TEST`
  - Add the text "`APMAIL`" to your status text to be notified of messages when you post a position report
  - https://www.youtube.com/watch?v=UdaCcWFrYMY

- "**Fixing**" the lame data entry for Yaesu radios using a MobilinkD and APRS on your phone. https://www.youtube.com/watch?v=Vt_RxQYt5DU

- Jason - KM4ACK mentions that he uses **PocketPacket on iPhones for APRS**. https://koomasi.com/pocketpacket/

- New **IRC** (Internet Relay Chat) like feature for APRS with the service IRC.
  - You can send `IRC /join #SMRA` to join the SMRA chat room. Send IRC /leave #SMRA to leave the "room".
  - Craig KM6LYW's video on IRC: https://www.youtube.com/watch?v=9ptGzQcy_bE

Post Presentation Additions (August 3 2024)

- Using the APRS “EMERGENCY” signal:
  - In the event if a dire emergency, you can set your location comment to “EMERGENCY”
  - All stations (Yaesu, Kenwood, YAAC) supporting this message will sound an alert
  - https://www.youtube.com/watch?v=EYX-snUu-Il

References / Other Resources

- KB9VBR - APRS YouTube Play List
  https://youtube.com/playlist?list=PLtTjGEOMh1fQ-elXGkxC5CZ2JLhJ4B1II&si=x_thgy-TIbdCA5fk
- Using APRSDroid: https://www.youtube.com/watch?v=JM7GYlHmSgc
- Portable DigiPeater (KM4ACK) Go Pack: https://www.youtube.com/watch?v=FTdbJbdAUGE
- Building a Pi Zero 2W DigiPeater (KM4ACK): https://www.youtube.com/watch?v=TCpt6NY1kew
- KM6LYK's DigiPi builds: https://www.youtube.com/watch?v=TCpt6NY1kew
- Mobilinkd website http://www.mobilinkd.com/
- APRS Crash Course: https://www.youtube.com/watch?v=24hnEjIoZQA
- Digipi Website: https://digipi.org/
- WxBOT commands: https://sites.google.com/site/ki6wjp/wxbot
- More details on APRS / YAAC: https://www.ka2ddo.org/ka2ddo/APRS-for-PhilMont.ppt
- Adding your weather station to APRS: https://wx4wcs.com/connecting-an-old-weather-station-to-aprs/

Glossary of APRS Terms (1/4)

APRS
Automatic Packet Reporting System – a digital real-time tactical communications system for exchanging information via radio.

APRS-IS
APRS Internet System – the global server network that routes APRS packets over the Internet.

Beacon
A periodic position/status packet sent by a station (e.g., every 10 min).

CWOP
Citizen Weather Observer Program – hams who contribute weather data to NOAA via APRS.

DigiPeater
A station that re-broadcasts heard APRS packets to extend range (like a repeater for data).

Glossary of APRS Terms (2/4)

DireWolf
Open-source software modem/TNC that decodes and generates APRS packets on a computer or Pi.

DPRS
D-STAR Packet Reporting System – not compatible with standard APRS (ICOM only).

GPS
Global Positioning System – provides lat/long for mobile position reports.

IGate
Internet Gateway – bidirectional link between RF APRS and APRS-IS.

MPAD
Multi-Purpose APRS Data service – answers weather, repeater, map, satellite, etc. queries.

Glossary of APRS Terms (3/4)

Path
The route a packet takes (e.g., WIDE1-1,WIDE2-1).

POTA
Parks On The Air – use APSPOT to self-spot.

SMS / SMSGTE
APRS-to-cellular text service. SMSGTE currently offline; “SMS” requires opt-in at aprs.wiki/SMS.

SSID
Secondary Station ID – suffix after callsign (-0 home, -7 mobile, -9 car, etc.).

TNC
Terminal Node Controller – hardware that converts audio ↔ AX.25 packets (e.g., Mobilinkd, DigiRig).

Glossary of APRS Terms (4/4)

VOX
Voice-Operated Transmit – used in cheap phone+radio APRS setups (flaky).

WXBOT
Weather bot – reply with location-based forecast when messaged.

YAAC
Yet Another APRS Client – Java GUI for maps, messaging, and DireWolf control.

144.390 MHz
US national APRS frequency (VHF-FM).