

All Things Digital

Amateur Radio for the 21st Century
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APRS PART 2: DIGIPEATERS, I-GATES AND SERVERS, OH MY!

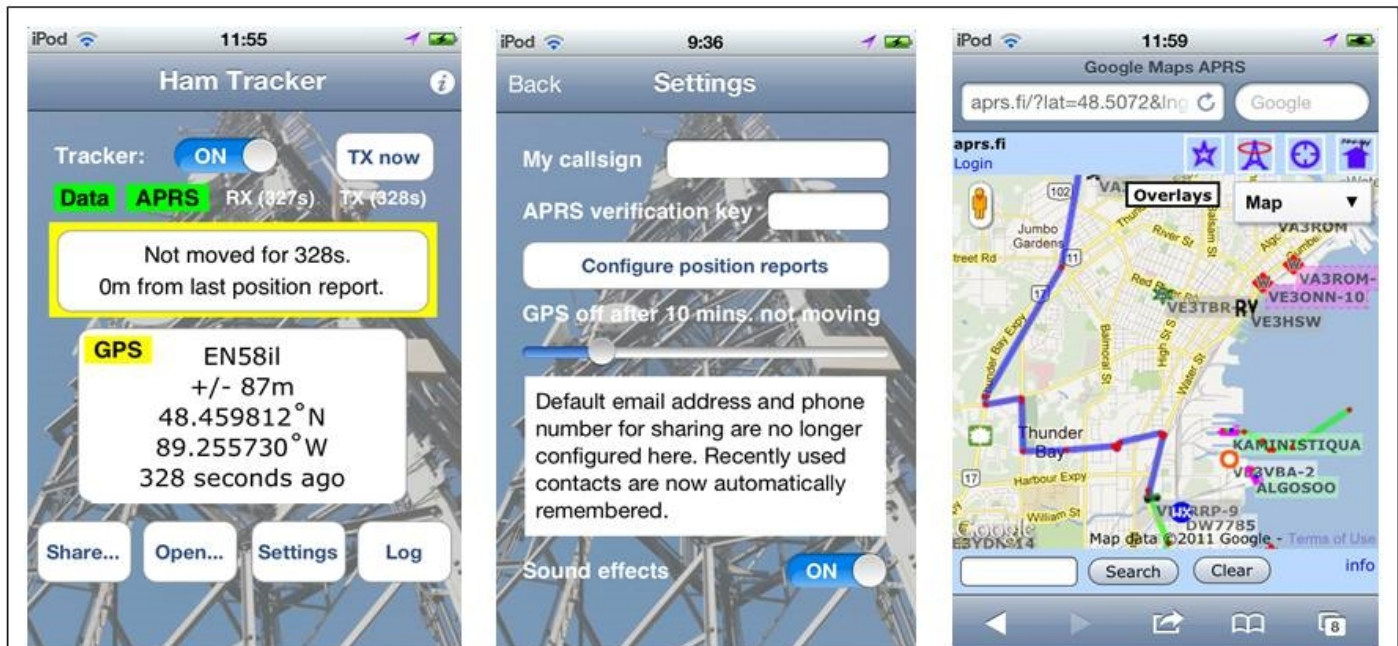
The “S” in APRS stands for “system”; it’s a world-wide, real-time tactical (here and now) system combining both VHF/HF radio and the Internet. We are all familiar with voice repeaters that extended the range of your HT (or mobile) to talk to someone with whom you can’t via simplex. A digital repeater (digipeater) does the same thing with digital signals, but to get your signal to the Internet, we need an I-Gate (Internet Gateway) station with a full-time Internet connection that listens for any APRS packets (received directly or via a digipeater) and steers or “gates” them to one of the many world-wide APRS Internet system servers (APRS-IS). These servers save and redistribute collected data for others to retrieve and display using web browsers or APRS programs (such as UIVIEW, ARPS/CE, XASTIR, AGW Tracker, etc.).
Note: Many area (wide coverage) digipeaters are co-located with voice repeaters, but they usually don’t have on-site Internet access and rely on a nearby I-Gate station.

Home-based APRS stations often function as local coverage “fill-in” digipeaters and/or I-Gates; so if APRS isn’t present or accessible from where you live, you can do something about it and setup your own digipeater/I-Gate station and connect to the APRIS-IS! Other Hams build and maintain the APRS-IS servers taking in the thousands and thousands of feeds from the connected I-Gates world-wide. They use computers with tremendous “horsepower” and memory capacity (usually Linux based with quad-core processors and multi-Terabyte disk storage). For a detailed description see Wikipedia: <http://tinyurl.com/dfs2vm>.

CAN YOU SEE ME NOW?

The next logical step is to transmit your position (posits) into the APRS system when travelling or from a fixed location. You won’t have to constantly tell people where you are as they’ll be able to see where you are and view your track/travel history, and this is just one of the handy features of APRS. Many Hams carry and use (on a daily basis) cell phones and radios; in my case it’s Apple iDevices and a Kenwood D72 HT. There are at least four iAPRS applications you can download (very inexpensive), and the easiest to setup and use is called “Ham Tracker”.

The APRS apps use the iPhone's internal GPS to track you via the regular cellular phone network, or they can triangulate your position when connected to a Wi-Fi hot-spot (iPhone, iPod, and iPad). Transmitted APRS posit beacons are very small (less than 70 characters, so you'll never use up your phone's data plan upload or download limits. To use these apps, you need to register your callsign with the APRS-IS, and a free Windows program called "APRS Validate" (see my "All Things Digital" web page) generates a unique validation (verification) number (based on your callsign) you enter into APRS program(s).



The image displays three screenshots from an iPod/iPhone interface. The first screenshot, titled "Ham Tracker", shows a status bar at 11:55. The app interface includes a "Tracker:" toggle set to "ON" with a "TX now" button. Below this, it shows "Data APRS" with "RX (327s)" and "TX (328s)". A yellow box highlights the text: "Not moved for 328s. 0m from last position report." Below that, a "GPS" section displays: "EN58il", "+/- 87m", "48.459812° N", "89.255730° W", and "328 seconds ago". At the bottom are buttons for "Share...", "Open...", "Settings", and "Log". The second screenshot, titled "Settings", shows a "Back" button and "Settings" title. It has input fields for "My callsign" and "APRS verification key", a "Configure position reports" button, and a slider for "GPS off after 10 mins. not moving". A text box explains: "Default email address and phone number for sharing are no longer configured here. Recently used contacts are now automatically remembered." There is also a "Sound effects" toggle set to "ON". The third screenshot, titled "Google Maps APRS", shows a search bar with "aprs.fi/?lat=48.5072&inc" and a "Google" button. Below is a map of a coastal area with various APRS stations marked, including "VA3ROM", "VE3ONN-10", "VE3TBR", "VE3HSW", "KAMINISTQUA", "VE2VBA-2", "ALGOSOO", and "VU2ARP-9 DW7785". The map includes "Overlays" and "Map" controls, and a search bar at the bottom.

Ham Tracker www.kramstuff.com

It's a straight-forward and very easy to setup and use app with email, SMS, and social media support. It runs silently in the background, but you can turn it off whenever when you want total privacy.

Just enter your callsign, APRS verification key, and configure your position report—that's it! If you've done it right, you can view your beacon via the <http://aprs.fi> website and obtain information about your station or any others. You can see the APRS tracks and position reports (posits) from mobile and portable stations, check weather reports, locate home stations, repeater sites, or specialty stations feeding into the APRS-IS. The Kramstuff website has more program details including several other nifty Amateur Radio iApps. (Images captured from my iPod.)

You can also check out the other Apple iOS APRS apps: iBCNU, Pocket Packet, and OpenAPRS (<http://www.openaprs.net>). An excellent use for smartphone based APRS trackers would be for marathons or other races; one or two of these carried in armbands of the elite racers allows you to follow them around the course and stream the data back to Net Control for display to the public on-site and over the Internet. Everyone watching, anywhere in the world, will feel as if they are in the race! Use them with the sweeper vehicle(s) and you can mark the tail end of the course(s). *Note: Other smartphone operating systems such as Android have APRS apps, and they operate the same as their Apple counterparts.*

VHF APRS TRANSCEIVERS

They may be called “handi-talkies”, but compared to my iDevices they are like carrying a brick on your belt! The new Kenwood D72 HT comes with everything needed in a self-contained unit: APRS and packet radio TNC (A and B bands), multi-channel GPS with 5,000 waypoint logger, dual VHF/UHF transceiver with full-duplex and cross-band support including APRS digipeating. It’s a bit more complex to setup (I use the free Kenwood MCP-4A programming software), but a radio-based APRS HT frees you from Wi-Fi and cellphone networks, plus many Hams prefer using “real” radio. It’s pricey, but it’s like having three separate pieces of hardware sans the interconnecting tangle of cables.

Kenwood D72: The APRS HT “Cadillac”. It’s the only HT that can almost do it all. USB cable connectivity, built-in GPS with 5000 waypoint logger, 1000 memory channels, Sky Command II radio control, full-duplex with cross-band repeating, APRS digipeating capability, and packet radio TNC (1200/9600 Baud, A or B channel). You can send and receive short text message, or display data on any APRS stations you receive. Oh, and you can also use it to talk!

My D72 is displaying the course and speed of APRS mobile station VE3DG-14. The -14 is called the Secondary Station Identification (SSID) and tells me that Carl, VE3DG, is driving an 18-wheeler or a large truck. Other data I can access: type of tracker or radio used, his status, voice frequency monitored, grid square and distance/bearing from me, APRS symbol, course, speed, altitude, latitude and longitude, any digipeaters used to get his posit to my HT, and his last beacon date/time. Wow! Information overload or what?!

If I was driving down the road and my D72 alerted me to his beacon (a feature called APRS voice alert), I could call Carl on whatever frequency he’s monitoring, or drive to where his truck is by following the D72’s on-screen RDF direction finder. It’s a great way to practise impromptu APRS “fox hunts”, and you can program its GPS to transmit various levels of positional ambiguity. There’s a nifty UIVIEW add-on (written by Chris, PA7RHM) designed for radio direction finding using data from at least two stations to plot bearing lines on a UI-View map display and calculate a fix.



Yaesu has entered the APRS market but the Kenwood APRS transceivers are superior and worth the extra money for serious APRS and packet radio user (IMHO). I do own a VX-8GR HT, and it is smaller and lighter than my D72.

The 8GR has an internal GPS, 1000 memory channels, but only one APRS modem (B channel only), and no internal packet radio TNC, no full-duplex, no digipeating, no cross-band repeat, plus the built-in APRS functions aren’t very sophisticated. It also puts out a narrow-banded deviating APRS signal making it impossible for TNC’s without a specific chip to decode the signal, but soundcard packet radio programs (U7HO SCM and AGW PE) can decode and display these under-deviating (from the old-school norm) signals.

Now, why would anyone ever want to use an APRS enabled HT? In my case, I don't use the more traveled bush trails (but I'm still within spotty cell or VHF radio coverage) and often run into deer, bears, and other four-legged creatures instead of the two-legged ones! If I don't come home, any concerned party can look up my callsign on the APRS.FI website, see my track history, and have some idea of where to find my carcass! I've had some nasty trail accidents but have been lucky (so far) to hobble out. And if you steal my car, a hidden "black box" APRS tracker will provide the police a detailed trail right to your backdoor!

MY FINAL

In the next column, I'll talk about the various APRS "black boxes" trackers, soundcard-radio interfaces, and discuss fixed APRS use with a computer. Many Hams can't afford APRS enabled transceivers or smartphones but would like to try APRS without spending a lot of money.—73