Newcomers and Elmers Net: APRS
By Robert Gulley AK3Q

APRS (Automatic Packet Reporting System) is a system designed around mobile communications, but with many uses for base operations as well. APRS was the brainchild of Bob Bruninga (WB4APR), and has been in continual development by Bob and others for over 20 years.

As Bob notes on aprs.org:

> APRS is not a vehicle tracking system. It is a two-way tactical real-time digital communications system between all assets in a network sharing information about everything going on in the local area. On ham radio, this means if something is happening now, or there is information that could be valuable to you, then it should show up on your APRS radio in your mobile . . . . APRS also supports global callsign-to-callsign messaging, bulletins, objects email and Voice because every local area is seen by the Internet System (APRS-IS)! APRS should enable local and global amateur radio operator contact at anytime-anywhere and using any device.

Many folks have the misconception that APRS is basically just a GPS-enable tracking protocol, often misstating the meaning of the acronym as Automatic Positioning Reporting System.
-- APRS is first and foremost a *packet* protocol, with the reporting being anything the user chooses to send as a block of information.
-- Some examples include: local repeater information (which can be tuned in with the press of a button) along with club information; weather information; announcements of local events; traffic conditions; voice alerts for simplex or repeater operation with other nearby hams; messaging; Internet linking through I-gates, and a host of other information sent over packet radio.

APRS can really hit full-stride when used during emergency training ops or in the field during actual emergencies.
-- The learning curve for this kind of operation is fairly steep, but with regular practice this can become second nature. The ability to map out locations, assets, and logistical information on real-time maps is crucial to effective emergency operations, and this can be done easily with existing software/hardware combinations.
-- Many radios now include APRS capabilities, or even GPS capabilities, and any radio with DTMF capability can be used to send messages even if the radio is not APRS-capable.

Setup can be a bit tricky depending on whether a radio has its own terminal node controller (TNC) or an external one is used, or if the sound is ported to a computer where software emulates the TNC. My initial APRS setup was with an old MFJ-1270C and a Kenwood TR-7400A (yes, with *dials* and *switches* for each part of the frequency tuning) which I bought as a set from a fellow who was cleaning out his shack. I will not get into all that I had to do to get it working, but let's just say it involved three different 1270s and a ROM upgrade (remember those?!). And then the software.

Fortunately things have gotten much easier with radios that have built-in TNCs or that connect to a computer with software TNC emulation. Still, it was a good learning experience, and if the TNC/radio connection is already in place, getting on to APRS will be a breeze.

The other common issue will be connecting between the radio and the computer or between the TNC and the computer.
-- The usual caveats apply as most have probably encountered: the computer must have a serial port connector or a converter between serial and USB. FTDI chips seem to work best, but I have heard Prolific has gotten their drivers to work with Windows 7/8 now. Just buyer beware.
-- Avoid cheap cables from unknown names—there are a lot of counterfeit chipsets running around which claim compatibility, but which are either not compatible or are only partially compatible.

Position Reports
We'll get this one out of the way right off, because as noted before, many people never get beyond APRS's positioning capabilities.
-- APRS does indeed offer a wealth of support for positioning data, whether moving vehicles, fixed stations, planes, ships, or satellites. If it moves and can be measured chances are there is a way to get the information into an APRS format suitable for transmission.
-- Some of the more popular uses beyond following vehicles travelling down the road involve tracking hot air balloon launches, telemetry data from satellites, repeater locations/freq./tone, IRLP/Echolink nodes/freq./tone,

even important landmarks such as hospitals and police stations, or checkpoints along public service events.

-- Waypoints can be set as well as destinations, routes can be mapped and GPS logs can be saved or transmitted to track where you have been.

-- Hikers/campers can find these features particularly useful, and anyone searching for someone can use several available online maps to locate someone who might be lost or in distress.

-- APRS has even been used to track stolen cars since most thieves are not aware of its use.

Information

APRS can make good use of beacon services to announce repeaters, clubs, even allow a user to send a message which can trigger an automated response (auto answer) with all kinds of information relevant to hams in the area.
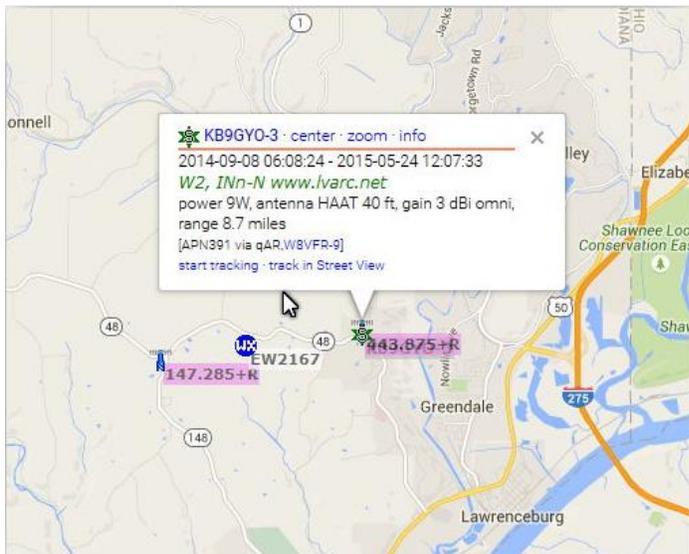

There are two repeaters here, a 440 (highlighted) and a 2m, both with APRS beaconing. Most APRS radios will have a QSY or TUNE option for a dual band radio to automatically tune the frequency into the voice band. This allows for quick contacts on a local repeater while keeping the APRS channel going independently.

In this case I happened to put a call out on the repeater and a friend of mine from Indiana happened to be monitoring the frequency, and was surprised to hear me. He then told me about the 2m repeater and some information about the location of each repeater.. I have added them to my list since I am able to hit them both from my home location.

Weather reports are common whether as fixed stations or as mobile stations with a weather unit attached. This can be particularly useful for tracking a storm path or finding out what weather is like down the road while traveling. Depending on the weather station's configuration, there can be a lot of information displayed beyond just the temperature and the wind speed!
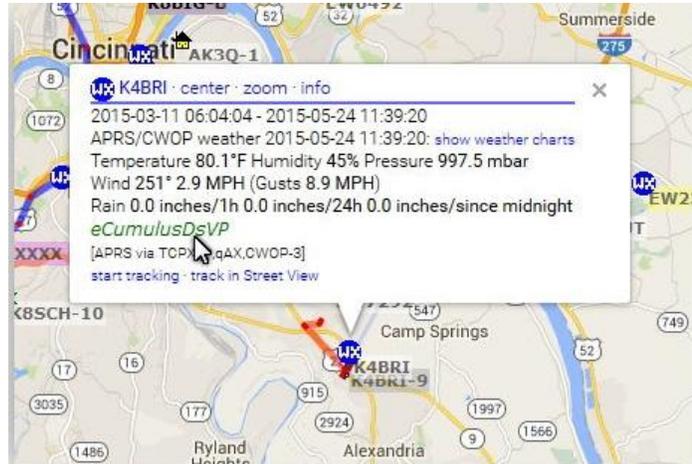

When viewing maps such as this one at aprs.fi a click on the icon displays whatever information has been associated with the call sign/ssid. There are icons for all types of fixed and moving objects, and most PC software packages have a means of selecting what objects will be included/excluded from view. Here is a typical ID from clicking on a home/stationary call.
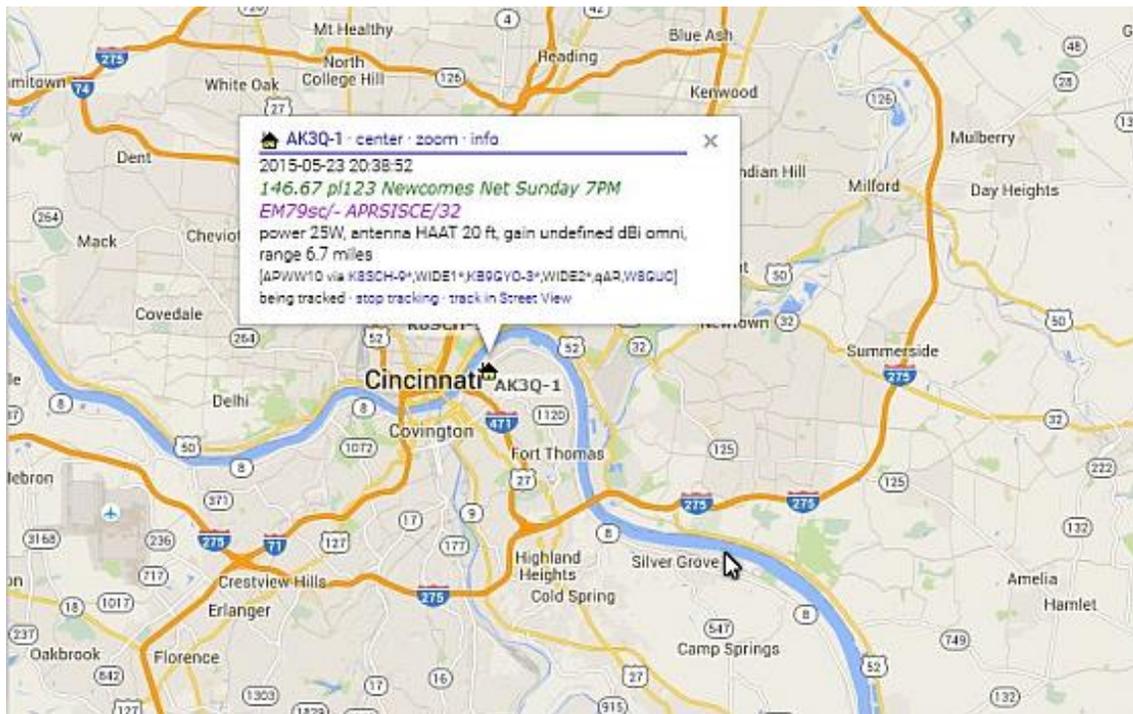
Notice that there is an option to track or follow a station, which is far more useful when an object is moving, such as the plane shown here:
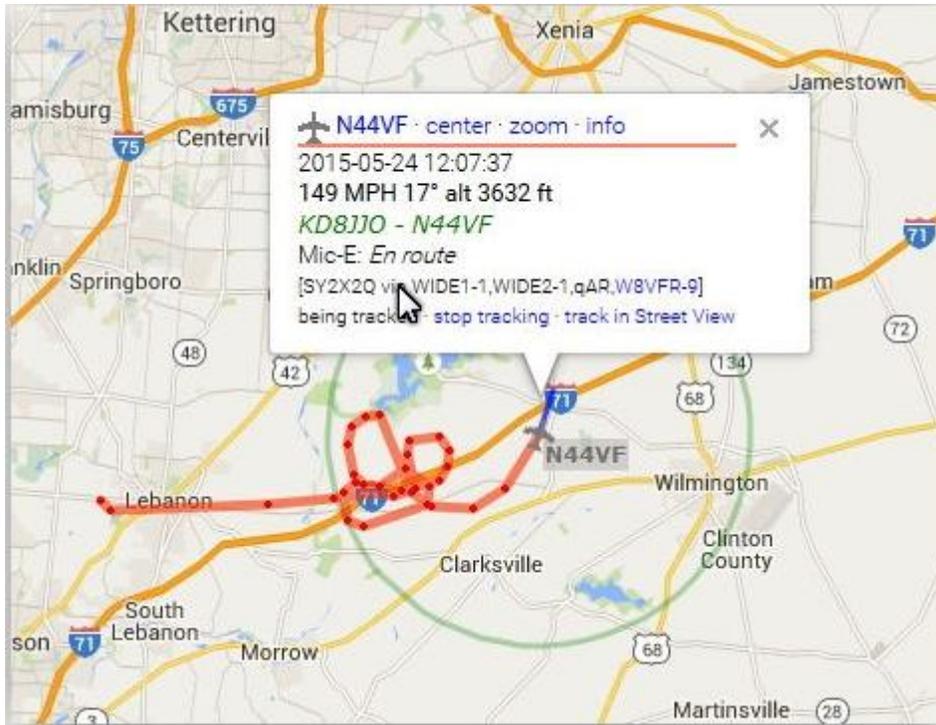
Note the speed (149 MPH) and Alt (3632 ft) and the tracked path. I would assume this is a small plane practicing maneuvers or doing a couple of "touch and go" landings. Here is the plane just a little while later:
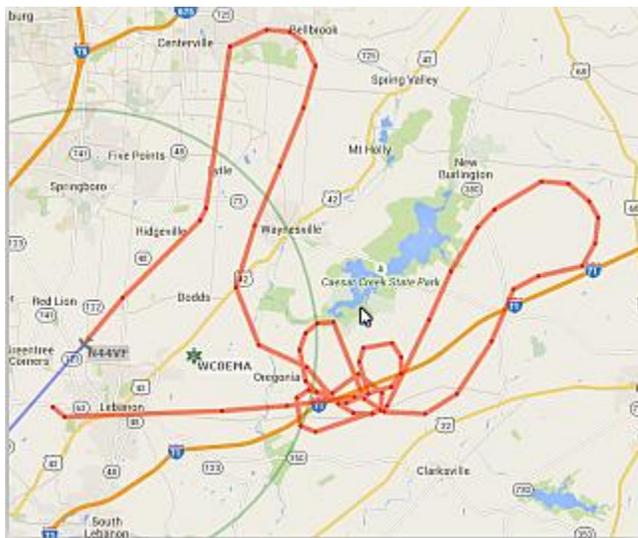
In addition to the path being tracked and plotted based on regular pinging of the APRS station, additional information is available to show activity over a recent period of time, along with stations which have heard or forwarded the APRS signal. Of course more information about the aircraft itself can be gained by looking up the plane's call letters, N44VF, on such sites as flightaware.com or planefinder.net.

Ham Radar
One of the less used but more interesting features of APRS is something which has become known as "ham radar" because it uses packet pings to alert other APRS users to the presence of someone on APRS frequency.
-- Here's how it works: when someone turns on voice alert (va) on a rig so equipped, a packet is sent out usually every 1-3 minutes as an identifier.
-- The packet is sent out with a CTCSS code of 100 which matches other APRS users who have set this same CTCSS code on their receiver. The only pings (or packets) which are heard on the receiving end are those which have been sent out with the proper CTCSS code. (There is nothing magical about this code – it is just the one which has been agreed upon by popular convention.)
-- Since the receiver is set to only pass the proper encoded packet to the speaker, the person listening will only hear a digital packet signal when someone else is seeking to chat.
-- A quick call on the current APRS channel and the two can move off to an agreed upon alternate frequency.
-- The best part is a person goes not have to have APRS on the receive end to use this feature. By simply monitoring the APRS frequency with the CTCSS code enabled, they can do the same thing: respond with a quick call and QSY to another frequency for voice chat.
-- And since the mode is simplex, and local ranges are only good for a few miles or so, the chats are quick and enjoyable.

Primary VHF Networks

- North America: 144.390 MHz (Voice Alert 100.0 Hz CTCSS, mobiles only please!)
- Europe: 144.800 MHz (Voice Alert 136.5 Hz CTCSS)
- Russia: 144.800 MHz
- Australia: 145.175 MHz (Voice Alert 91.5 Hz CTCSS)
- New Zealand: 144.575 MHz
- Argentina: 144.930 MHz
- Uruguay: 144.930 MHz (145.010 MHz also)
- Japan: 144.640 MHz 9600 baud / 144.660MHz 1200 baud
- South Africa: 144.800 MHz

Messaging
Messaging is another feature of APRS which gets some attention, but which is not fully utilized to its potential. Part of the reason for this is that most

radios do not have anything more than a DTMF keypad, much like flip phones without a keyboard.
-- While sending messages like this is a bit slower, it is not all the bad, and one can get pretty quick at it with practice. If one is using software on a computer then things are much faster, making it very useful for public service events or field day.
-- For the operators in the field with just their radio, usually responses are expected to be fairly short anyway, and messages can be pre-programed into memory slots on most APRS enabled radios.
-- And speaking of messages, it is very easy to send email through the APRS system. Here is one I sent to myself from my radio:

testing

 Date   : 2015-05-25 00:59:46 UTC
 From   : AK3Q-1
 To   : AK3Q@AK3Q.COM
 IGATE   : W8VFR-9

OpenAPRS.Net Message to Email Gateway

The message option could not be easier. In the "To: " field type "EMAIL" and then in the first line of the message place the email address. So in the above instance, I would write "ak3q@ak3q.com testing" and then send. That's all there is to it!

There are literally dozens of ways to send text messages through APRSINCLUDING THE International Space Station. This page describe many such modes in much greater detail.