

APRS

Amateur Position Reporting System

What is APRS

APRS tm stands for Amateur Position Reporting System. APRS is a digital system used by amateur radio operators to pass information using single, short, unacknowledged packets of data. Typically these packets contain position information that can be used to locate the sender on a map. However, they can also be used to send short messages, weather or telemetry from Instrumentation.

APRS was developed by Bob Bruninga, WB4APR, with work starting in 1984. Since that time, it has grown into a worldwide service with over 25,000 users. APRS over radio is intended as a short range tactical system, while an internet backbone provides long distance transmission.

Applications

- Mobile Station Location
 - Cars
 - Pedestrians
 - Boats
 - Airplanes
 - Balloons
- Announcements / Advertisements
 - Club Meetings
 - Repeater Freqs
 - Public Service Events
 - Disaster Management
- Data & Telemetry
 - Weather stations
 - Science instruments
- Satellite Communications
 - ISS
 - Others...
- Meteor Scatter Communications
- Direction Finding
 - Omni-DF
 - Doppler

How APRS is Transmitted

Typically, APRS stations transmit a short packet (1 second or less) using a 1200 baud TNC (Terminal Node Controller – basically a radio modem). In the United States, all APRS operation is on a frequency of 144.39MHz.

Similar to voice repeater operations, a conveniently situated digipeater (often 1 in a county sized area) rebroadcasts the packet to all stations within hearing distance. The packet is heard and rebroadcast on the same frequency to all local stations in hearing range. Packets can be heard and rebroadcast several times by chains of digipeaters, covering hundreds or thousands of square miles.

A digipeater that is intended to cover a wide area is known as a WIDE digi. Some digipeaters are intended to relay traffic from a small area to a local WIDE digi. These are known as RELAY digipeaters.

APRS and the Internet

APRS information is mostly of interest only to users in the local area of an APRS station that is transmitting. However, there are times where we want to see APRS data far away, or send short text messages out of our local area. The proper way to transmit APRS over long distance is across the internet.

APRS stations that have convenient internet connections can gateway APRS traffic onto the internet to a set of servers that collect and retransmit the traffic. If you use APRS software and have an internet connection, you may be able to see this internet traffic directly without having a radio.

APRS traffic can be transmitted from the internet to RF, but this must be very carefully controlled because the amount of worldwide internet traffic is far greater than the amount of available radio time.

Types of APRS Stations

- Tracker – A mobile station that is intended to transmit the location of a vehicle. Usually does not have a display
- Mobile Station – Intended to transmit the location of a vehicle, but does have a map display
- Fixed Monitor Stations – Station with a map display, but probably not a GPS receiver. Used by net controls, etc., to see where stations are.
- Weather or Telemetry – Is hooked up to a weather station or other instruments, transmits primarily data
- Digipeater – Station that is intended to relay packets. True wide area digipeaters should be rare and only put in operation by groups of users. Relay digipeaters may be used to fill coverage gaps for wide digipeaters.
- Internet Gateway – A station that relays packets from on the air to the internet

Simple, transmit-only APRS stations can be constructed that cost less than \$100.

APRS Path Settings

APRS users can control, to an extent, how their traffic is transmitted and where it can go. Because packets can be retransmitted far, far out of their local area, responsible APRS users must configure their stations correctly to prevent their traffic from causing interference to stations thousands of miles away. The following commands may be combined to control how their data is transmitted.

- RELAY – Tells relay-only digipeaters to relay this packet to a wide digipeater. Only use as first entry in path
- WIDE – Tells a wide digipeater to relay this packet. Should only appear once as first or second entry
- WIDEn-n – Should only appear once as first or second entry. Replace n with a number 1 – 3, indicating the number of digipeaters you want to traverse. (note: each digipeater can cover a hundred miles or more, so be careful)
- TRACEEn-n – Tells wide digipeaters to relay this packet and append their station ID to the packet. For temporary experimentation only because this makes the packet larger and wastes airtime.
- GATE – Means “gate packet to HF”
- NOGATE, RFONLY – Mean “don’t gate to Internet”
- TCP/IP, TCPXX, qXX – Only used by the APRS internet backbone system.

Recommended Paths

- Mobile – RELAY,WIDE or RELAY,WIDE2-2
- Portable – RELAY,WIDE or RELAY,WIDE2-2
- Fixed – DIGICALL, DIGICALL,WIDE or DIGICALL,WIDE2-2
- Digis – No path
- Special Events – RELAY or RELAY,WIDE
- Airmobile – WIDE or WIDE2-2

NEVER use a WIDE path greater than 3-3. Doing so can cause interference to stations thousands of miles away.

Beacon Rates

- Fixed Stations – 20 minutes
- Mobile Stations – 3 minutes
- Airmobile Stations – 5 minutes
- Special Event Stations – 3 minutes
- Digis – 20 minutes
- Wx Stations – 5 to 15 minutes

In the North Texas Area

APRS is in widespread use in the North Texas area. Many counties have digipeater coverage. If your county does not have a digipeater, you can work with your local club or emergency organization to set one up.

APRS is very useful for working public service events that are scattered over large areas. APRS is also useful to track stations during disaster management activities.

However, some county organizations may have their own rules for APRS usage during Skywarn events due to possible conflicts with 2m voice traffic. Be sure to discuss with your organization before using.

TNC and Tracker Equipment

Kantronics - <http://www.kantronics.com/uhfvhf.htm>

TinyTrak, WeatherTrak - <http://www.tinytrak.com/>

Opentracker - <http://n1vg.net/opentracker/>

Tigertronics - <http://www.tigertronics.com/>

GPS Receivers

There are too many compatible GPS receivers to name individually. However, any APRS capable GPS receiver must have a serial (RS-232) data connection. Typically, Garmin eTrex handheld receivers and Deluo receivers are good choices for good performance at a reasonable cost.

Garmin - <http://www.garmin.com/>

Deluo - <http://www.deluoelectronics.com/>

GPS City - <http://www.gpscacity.com/>

Cables

Radio to TNC cables - <http://www.packetradio.com/>

GPS Cables - <http://www.ebay.com/>
(You will have to search for your GPS)

Web Sites

WB4APR's web site

<http://web.usna.navy.mil/~bruninga/aprs.html>

TAPR – APRS standard, national mailing list
<http://www.tapr.org/>

D/FW APRS Information
<http://www.dfwaprs.net/>

North Texas APRS Users Group
http://groups.yahoo.com/group/ntx_aprs Ug/

APRS software comparisons
http://www.eskimo.com/~archer/aprs_capabilities.html

GPS Information
<http://gpsinformation.net/>

Track APRS stations on the internet
<http://www.findu.com/>

Presentations on APRS hardware and software
<http://www.n5oom.org/aprs/>