



ABSTRACT

This document summarises the main features of the Automatic Packet Reporting System (APRS ®), describes how it works, and covers some of the issues that relate specifically to the UK.

Author	Ian Wade, G3NRW (g3nrw@arrl.net)
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INTRODUCTION

This White Paper

This document summarises the main features of the Automatic Packet Reporting System (APRS ®), describes how it works, and covers some of the issues that relate specifically to the UK.

The first draft version of this document was written in January 1999, to provide background material on APRS for the RSGB's Licensing Advisory Committee, VHF Committee and Data Communications Committee.

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- Bob Bruninga, WB4APR (the original developer of APRS and holder of the APRS trademark).
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- John Morris, GM4ANB (former chairman of the RSGB VHF Committee).
- Various members of the LAC, VHFC and DCC — with particular help from Iain Philipps, G0RDI (Chairman of DCC).
- Roger Barker, G4IDE, author of the UI-View package.
- Ciemon Dunville, G0TRT.

Plus many members of the APRS Special Interest Group.

Their help and encouragement are greatly appreciated.

Distribution

This paper may be freely copied and distributed in its current form. It is only available in PDF.

WHAT IS APRS?

Introduction

APRS started life in the United States in 1984 as the brainchild of Bob Bruninga, WB4APR. As originally conceived, the initials APRS stood for *Automatic Position Reporting System*, whereby packet radio was combined with the Global Positioning System (GPS) satellite network, enabling radio amateurs to automatically display the positions of radio stations on maps on PCs.

As APRS developed, further features not directly related to position reporting were introduced, such as weather station reporting, direction finding and messaging. This led to APRS being renamed the *Automatic Packet Reporting System*.

APRS is different from regular packet in several ways:

- It provides maps and other data displays, for vehicle/personnel location and weather reporting in real time.
- It performs all communications using a one-to-many protocol, so that everyone is updated immediately.
- It uses generic digipeating, with well-known callsign aliases, so that prior knowledge of the network topology is not required.
- It supports intelligent digipeating, with callsign substitution to reduce network flooding.
- Using AX.25 UI-frames, it supports two-way messaging and distribution of bulletins and announcements, leading to much faster dissemination of text information.
- It supports communications with the Kenwood TH-D7 handheld radio, which has built-in TNC and APRS firmware.



The Kenwood TH-D7 dual-band radio has a built-in TNC and APRS firmware.

Conventional packet radio is really only useful for passing bulk message traffic from point to point, and has traditionally been difficult to apply to real-time events where information has a very short lifetime. APRS turns packet radio into a real-time tactical communications and display system for emergencies and public service applications.

APRS provides universal connectivity to all stations, but avoids the complexity, time delays and limitations of a connected network. It permits any number of stations to exchange data just like voice users would on a voice net. Any station that has information to contribute simply sends it, and all stations receive it and log it.

APRS recognizes that one of the greatest real-time needs at any special event or emergency is the tracking of key assets. Where is the marathon leader? Where are the emergency vehicles? What's the weather at various points in the county? Where are the power lines down? Where is the head of the parade? Where is the mobile ATV camera? Where is the storm?

To address these questions, APRS provides a fully featured automatic vehicle location and status reporting system. It can be used over any two-way radio system including amateur radio, CB, marine band, and cellular phone. There is even an international live APRS tracking network on the Internet.

APRS Features	APRS runs on most platforms, including DOS, Windows 3.x, Windows 95/98, MacOS, Linux and Palm. Most implementations on these platforms support the main features of APRS:
	<ul style="list-style-type: none">• Maps — from 300 yards to worldwide coverage. All APRS stations are plotted. Stations reporting a course and speed are dead-reckoned to their present position. Overlay databases of the locations of APRS digipeaters, US National Weather Service sites and even amateur radio stores are available. It is possible to zoom in to any point on the globe.• Weather Station Reporting — automatic display of remote weather station information on the screen.• DX Cluster Reporting — APRS an ideal tool for the DX cluster user. Not only is it possible to see all DX spots on the map, but by operating in the monitor only mode, the overall packet load on the DX cluster is reduced. This is a benefit to everyone on the channel.• Internet Access — it is possible to telnet into Internet APRS servers and see hundreds of stations from all over the world live. Everyone connected can feed their locally heard packets into the APRS server system and everyone everywhere can see them.• Messages — two-way messages with acknowledgment. All incoming messages alert the user on arrival and are held on the message screen until killed.• Bulletins and Announcements —multi-line messages addressed to everyone. Bulletins are sent every 20 minutes for four hours, and announcements every hour for four days.• Traffic — a trace of recent messages monitored between other stations on the net. DX mode talk traffic also shows up here. A keyboard command will connect these stations with lines on the map.• All-Packet Log — a time-sequenced log of every new status or message received.• Heard Log — the total number of packets per station per hour. These statistics show the connectivity of the network over varying paths, such as HF, and show when stations enter and leave the net.• Digipeater List — a display of raw packet headers so that APRS users can see what digipeater paths are being used by other stations.• Fixed Station Tracking — in addition to automatically tracking mobile GPS/LORAN-equipped stations, APRS also tracks from manual reports or grid squares.

- **Objects** — any user can place an object on his own map, and within seconds that object appears on all other station displays. This is particularly useful for tracking assets or people that are not equipped with trackers. Only one packet operator needs to know where things are (e.g. by monitoring voice traffic), and as he maintains the positions and movements of assets on his screen, all other stations running APRS will display the same information.
- **ACARS** — If the TNC has an ACARS modem for receiving airline digital packets on 131.55 MHz, then a special version of APRS will plot the positions on the map of all aircraft in range (usually up to about 200 miles).

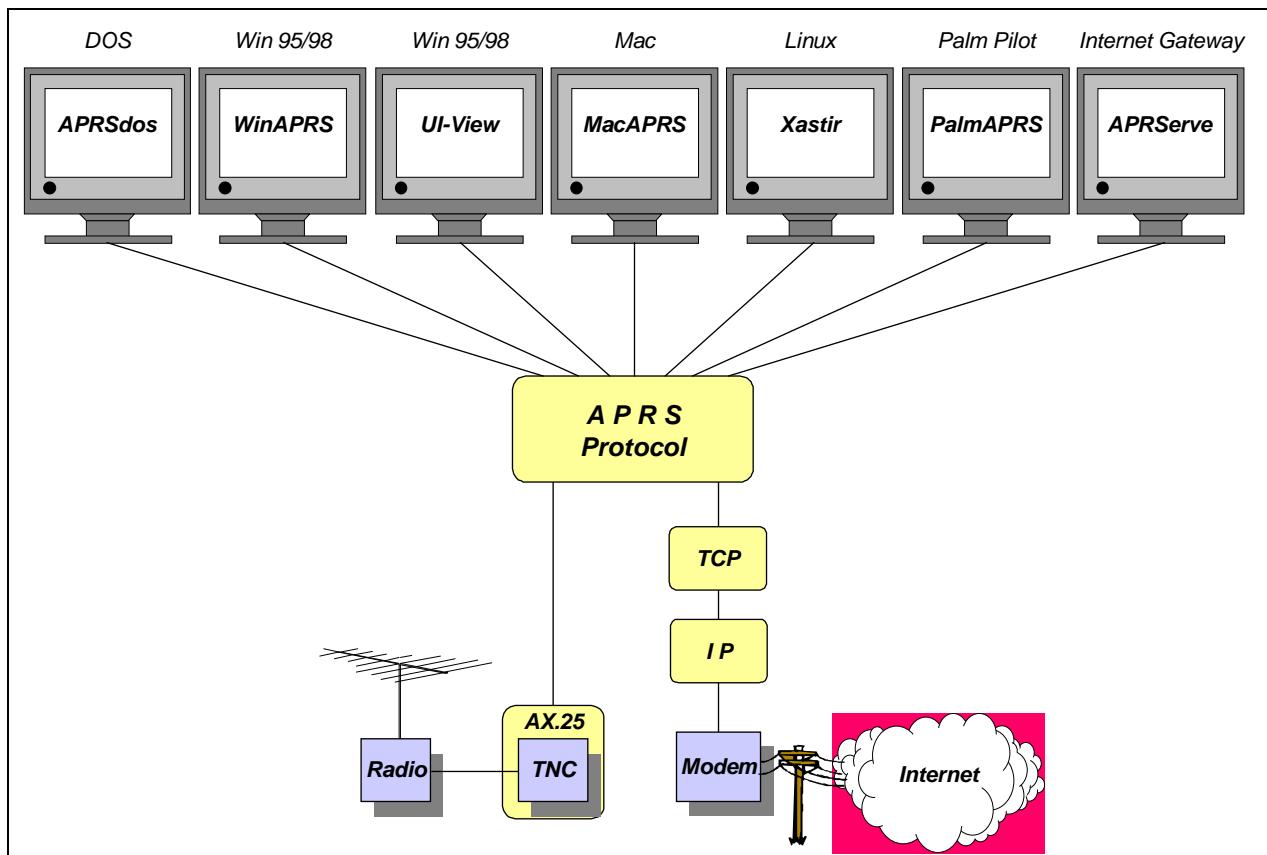


Fig 1: A sample of the many packages that use the APRS protocol. All of them support AX.25 communication via a TNC, and most of them also support TCP/IP connections via the Internet.

Space Applications

APRS is an excellent application for using orbiting packet digipeaters such as on the Shuttle, Mir space station, AO-16, WO-18, LU-19 and AO-26. APRS only requires one packet for everyone to see each station (compared against the typical connected SAREX mode which requires five successful packets).

Not only does APRS reduce channel loading, but it also capitalizes on the most fascinating aspect of the amateur radio hobby; that is, the display on a map of the location of those stations.

If everyone simply inserted their lat/long or grid square as the first characters of their beacon text, everyone within the satellite footprint would see the location of every successful uplink.

Similarly any 2m FM rig and any TAPR-2 compatible TNC can be used to digipeat APRS packets via any of the PACSATs, with only a small, inexpensive modification to the TNC.

Fox Hunting or Direction Finding

APRS is an excellent tool for plotting the location of a hidden transmitter, balloon, or interfering signal. APRS has several powerful DF tools:

- Plots the positions and bearing lines of all participating stations whether mobile or fixed.
- Plots the overlapping signal strength contours for omni-DF reports. This technique even plots big black circles for null reports so that you see all the areas where the fox is *not*. This omni technique is very powerful and can locate a jammer to a neighbourhood with no beams or special equipment.
- Fade-Circle Search and Rescue technique for single station signal strength location using only a omni antenna.
- Optional automatic DF interface to Doppler DF units for automatic plotting of DF bearings.

For tracking known objects that move at known speeds over a known course, such as the runners in a marathon, APRS will dead-reckon objects along the course. This makes it possible to follow the progress of the event, without having to strap trackers to the runners.

HOW DOES APRS WORK?

Trackers

A key component of APRS is the *tracker* — see Fig 2.

A tracker consists of a GPS receiver, a TNC and a radio. The GPS receiver uses the signals from the satellites to compute its position once per second, and outputs time-stamped ASCII text strings specifying the latitude, longitude and altitude of the receiver. These strings are fed into the TNC, which then transmits them as beacon text messages.

APRS transmissions are simply AX.25 Un-numbered Information (UI) frames. These are unconnected packets — that is, there are no conventional AX.25 connections to other stations.

With the exception of messaging (whereby individual stations can pass short messages to each other), APRS transmissions are intended for reception by all other stations participating in the net.

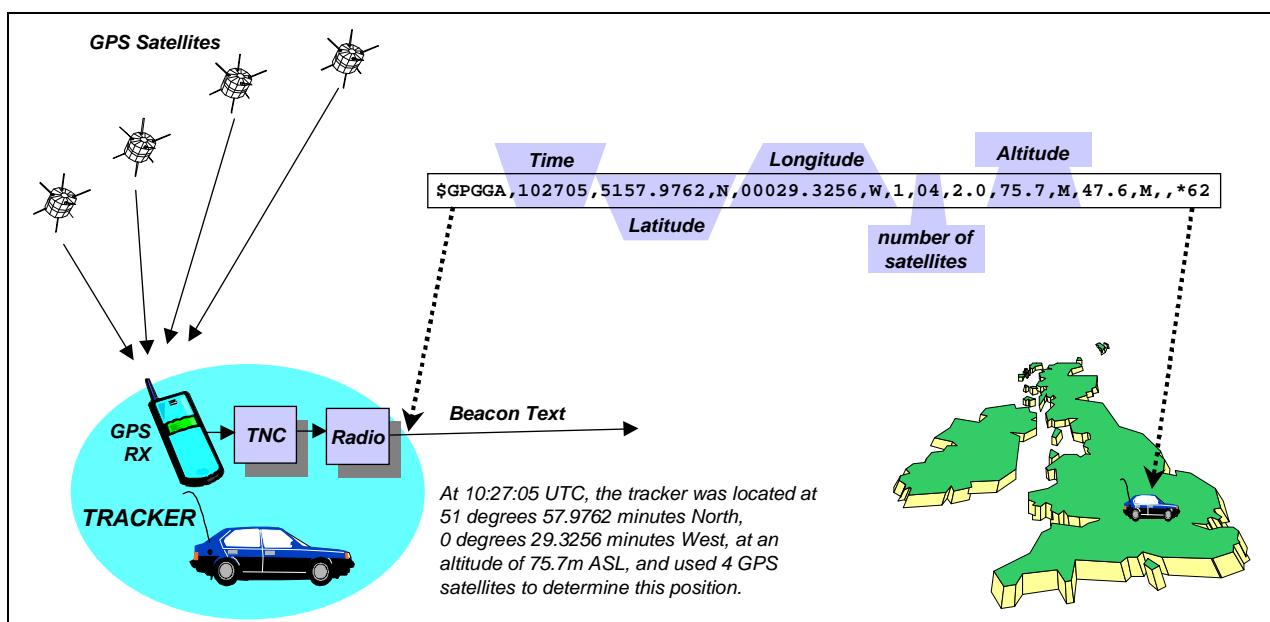


Fig 2: The tracker computes its position from received GPS signals, then transmits the position as an AX.25 beacon text string.

Position Display

Fig 3

Receiving APRS position beacons.

The APRS software running on the PC displays the positions on the map.

At the receiving end, any station equipped with a radio, TNC and a PC running APRS software can plot the position of the tracker — see Fig 3.

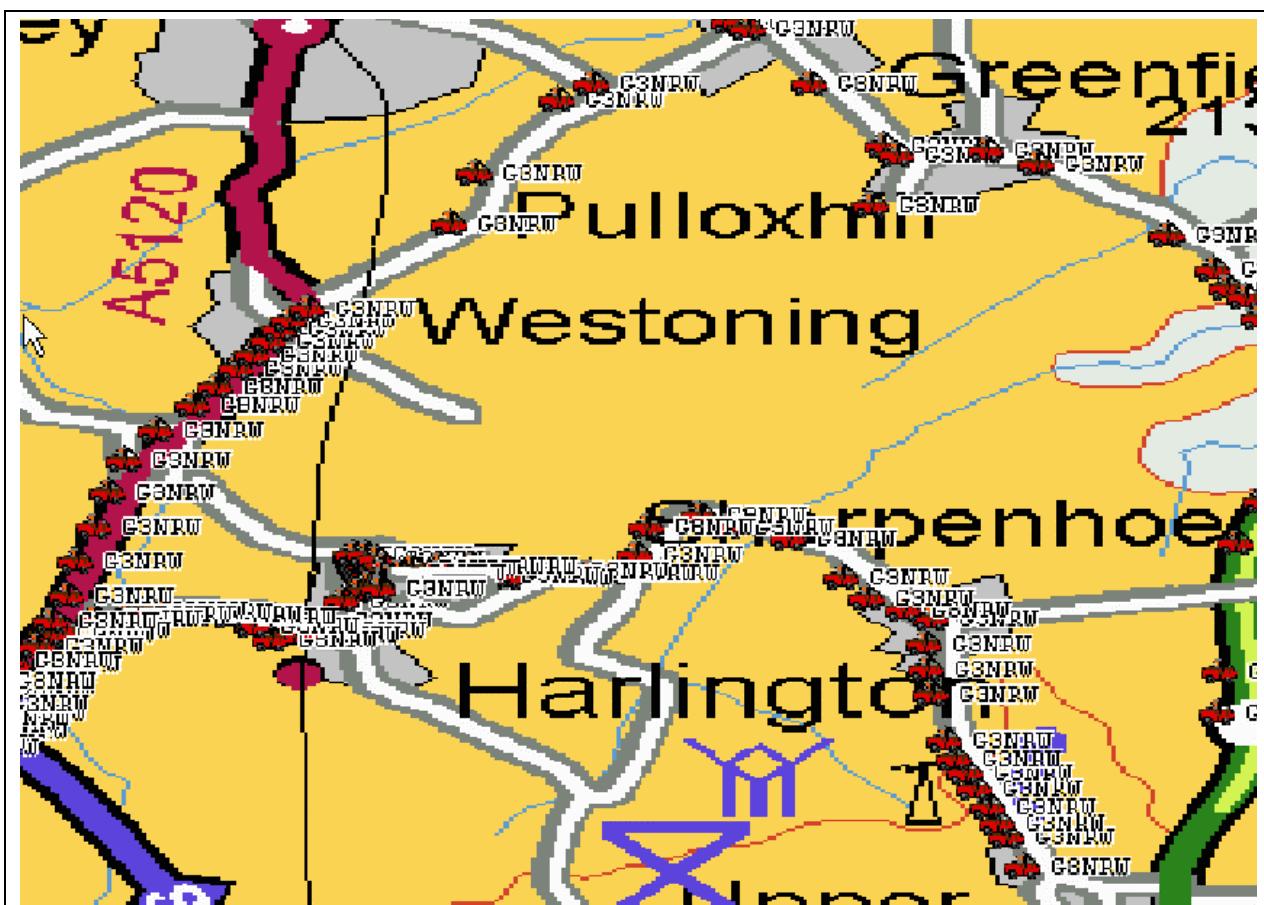
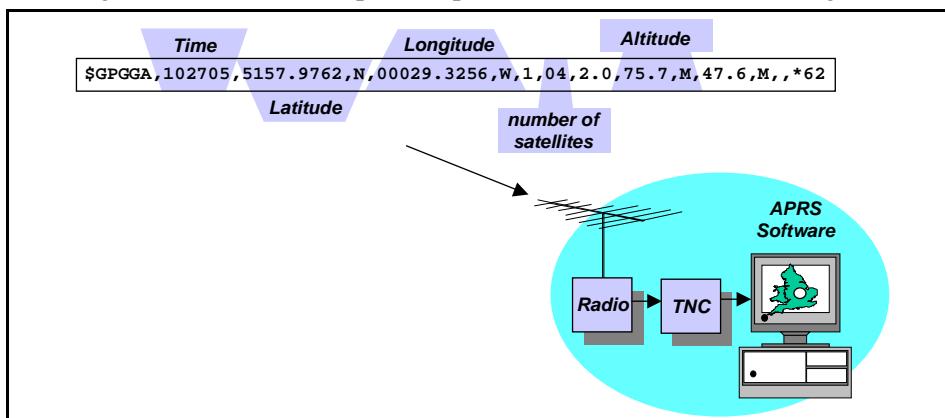


Fig 4: An off-screen example of a track plot. The position of G3NRW in his car around his home in Harlington, Mid-Bedfordshire, was transmitted on low power at 10-second intervals (this is an atypically high rate, for the special purpose of checking the accuracy of the map — a 30-second or one-minute interval is more usual for a mobile station). The large gaps between some of the plots arise through intervening hills causing loss of signal.

Routing Tracker Beacons via Digipeaters

If the tracker and the receiving station are in close proximity (as in Fig 3 above), digipeaters are not required. In that case, it is sufficient to simply set the destination of the beacon packets to something like `APRS`; e.g. by using the TNC command:

`UNPROTO APRS`

To be of real use, however, APRS needs a network of digipeaters to relay the APRS transmissions over a wide area. If the callsigns of the digipeaters are known, the `UNPROTO` path can be something like this:

`UNPROTO APRS via G9ABC,G9XYZ`

However, with mobile trackers moving over long distances or in unfamiliar territory, the callsigns of local digipeaters are probably unknown, and even if they were known it would be impractical to change the `via` routing when on the move.

To overcome this difficulty, most APRS digipeaters are assigned the generic callsign alias `RELAY`. Then all the tracker station needs to do is set the routing as follows:

`UNPROTO APRS via RELAY`

This will achieve semi-local coverage — see Fig 5.

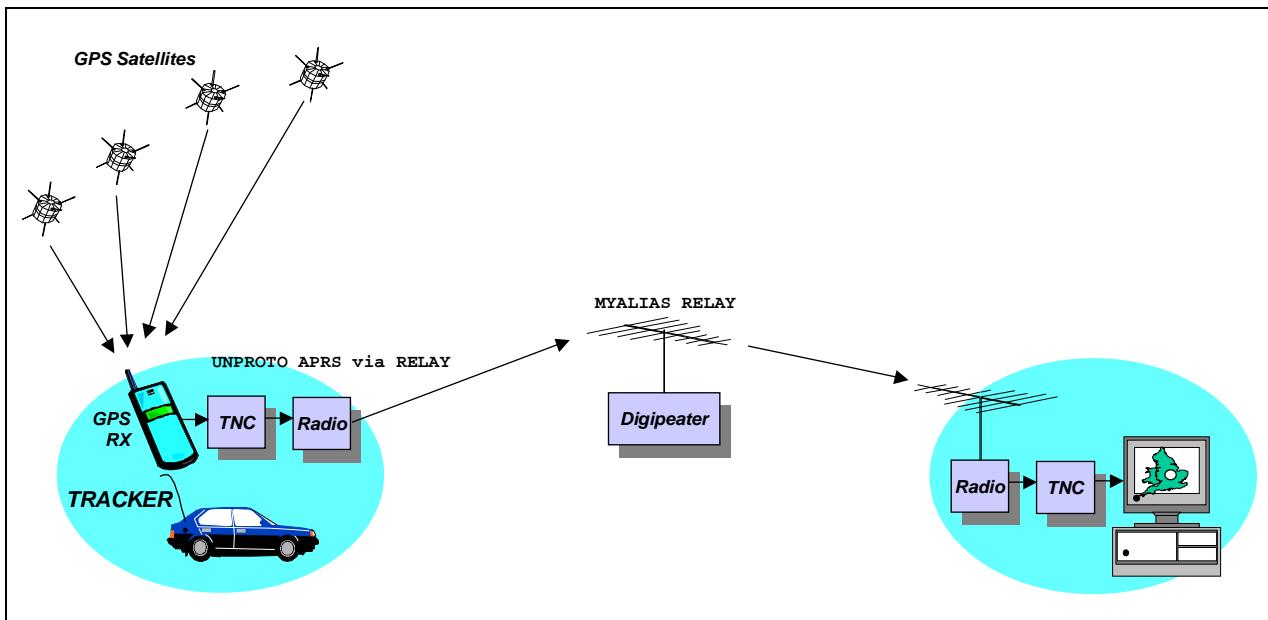


Fig 5: For semi-local coverage, APRS digipeaters have the callsign alias `RELAY`. Thus the tracker station does not need to know the digipeater's callsign, and does not need to change the `UNPROTO` path when moving from one area to another.

Wide Area Coverage

For wide area digipeating, some well-sited digipeaters (for example on hilltops) have the APRS alias WIDE. See Fig 6.

Thus, to achieve wide-area digipeating, the tracker can use the command:

UNPROTO APRS via RELAY,WIDE

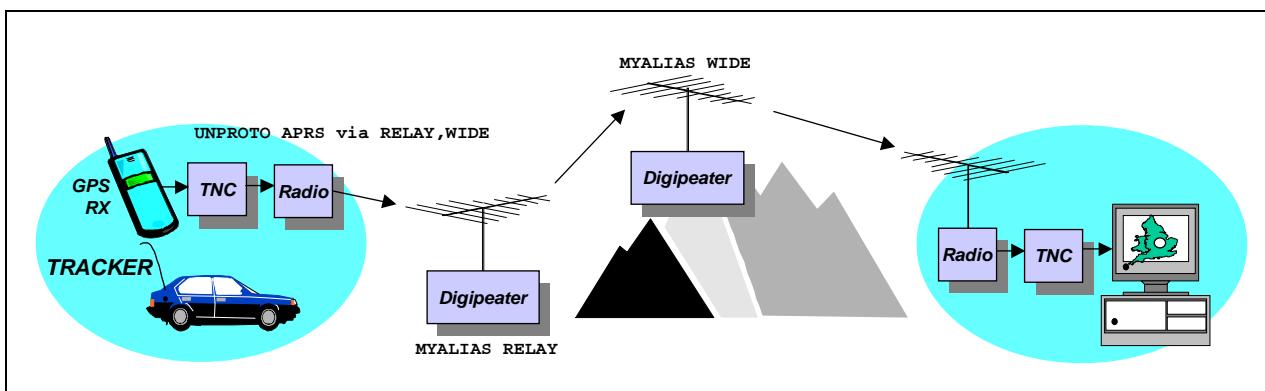


Fig 6: For wide-area coverage, APRS digipeaters have the alias WIDE. Again, the tracker station does not need to know digipeater callsigns, and does not need to change the UNPROTO path when moving from area to area.

Regional Coverage

In time, as the network grows, a chain of WIDE digipeaters will cover large regional areas throughout the country — see Fig 7. Hence the TNC UNPROTO command in the tracker becomes something like:

UNPROTO APRS via RELAY,WIDE,WIDE

This is the recommended UNPROTO command for all trackers, at least for the foreseeable future. [However, widespread use of simple WIDE digipeaters like these will eventually lead to network flooding problems. To overcome this, intelligent digipeaters will probably be introduced — these recognize when WIDE packets have already been repeated and do not repeat them again].

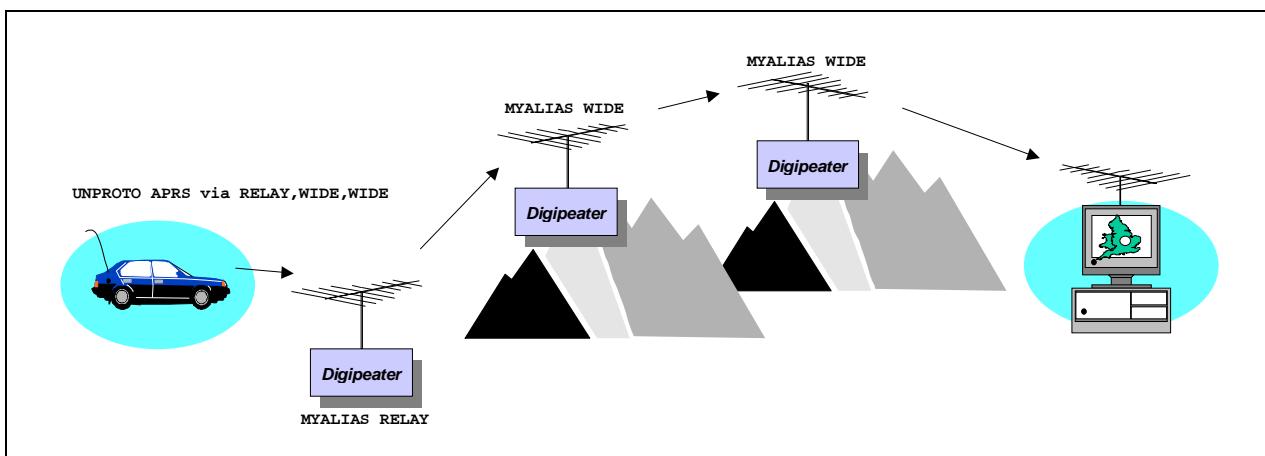


Fig 7: The recommended UNPROTO path of RELAY,WIDE,WIDE will cover large areas of the country.

Satellite Coverage

For even wider area digipeating, it is possible to route packets via a satellite. For example, to use the Mir space station (Fig 8), the UNPROTO command becomes:

UNPROTO APRS via ROMIR

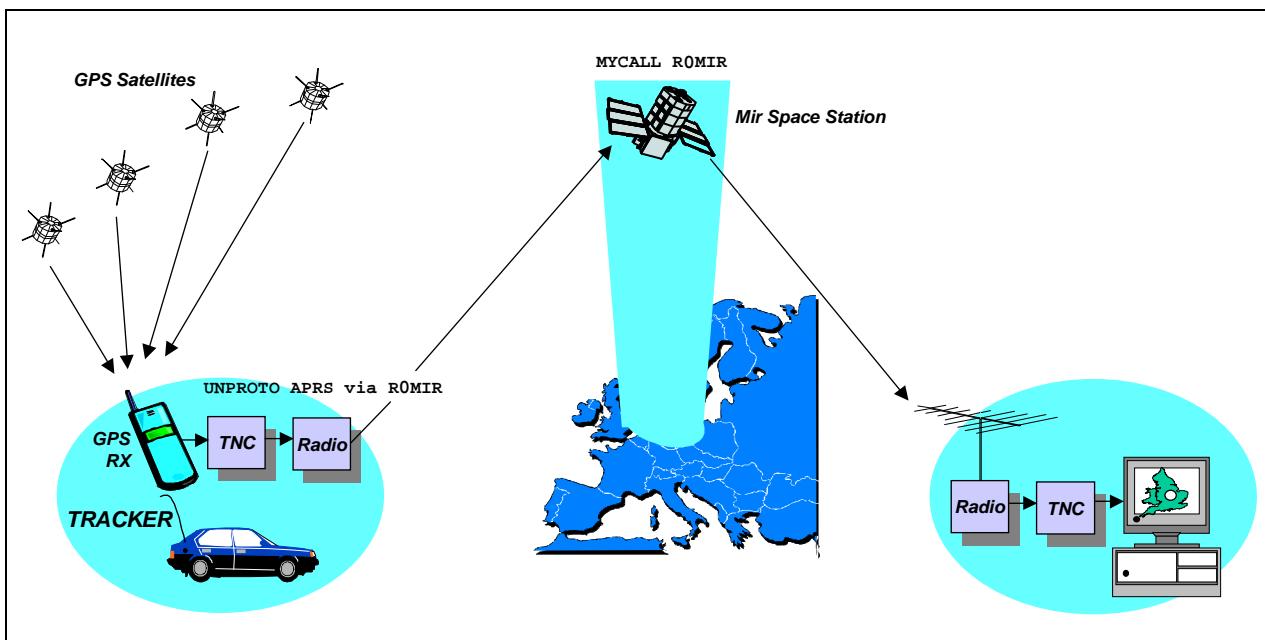


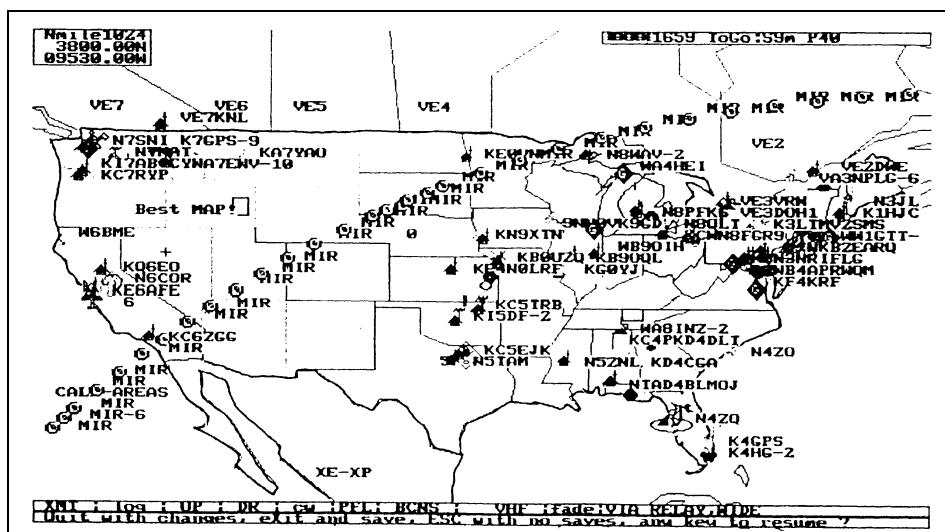
Fig 8: The ultimate in APRS tracking. When the Mir space station passes overhead, it is possible to relay tracker positions over a very wide footprint, using just a 5-watt handheld transmitter on 2m.

Fig 9

This is an APRS screen capture of Mir passing over the United States.

The downlink packets were collected by a few ground stations across the country, then combined via the Internet.

(courtesy Bob Bruninga, WB4APR)



Position Reporting without GPS

It is not necessary to have a GPS-equipped tracker to report a position in APRS. Station positions can be transmitted by including the lat/long coordinates in the beacon BTEXT string. For example:

```
BTEXT !5157.98N/00029.33W#
```

The first twenty characters of the beacon text string are formatted as shown in Fig 10 below. The latitude and longitude are expressed as degrees and minutes before the decimal point, followed by hundredths of a degree after the decimal point. Thus 5157.98N means 51 degrees 57.98 minutes (equivalent to 51 degrees 57 minutes 59 seconds) north.

The 20th character in the string is a code representing the symbol to be displayed on the APRS screen. In this example, the # symbol code will display as the digipeater symbol.

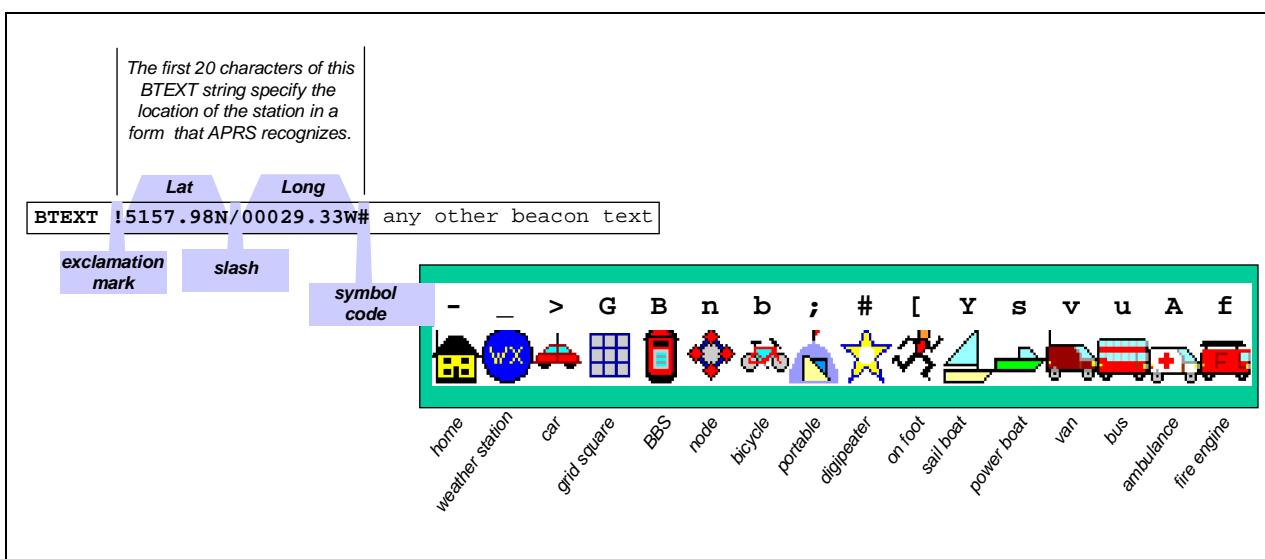


Fig 10: Any packet station can transmit a position by including the latitude and longitude coordinates in the first 20 characters of the BTEXT string. The 20th character specifies which symbol will be displayed on the map.

Turn every Packet Station into an APRS Digipeater

If every packet user in the country simply inserted their APRS position at the beginning of the BTEXT string as just described (whether using APRS or not), there would be enormous potential for experiments in propagation studies and network discovery, such as automatically producing maps of network topology.

To turn any packet station into an APRS digipeater, all that is needed are a few TNC commands like this:

```
MYALIAS RELAY
DIGIPEATER ON
MID 90
BTEXT !5157.98N/00029.33W# [IO91SX] DIGI=RELAY g3nrw@arrl.net
BEACON EVERY 180
```

The beacon message tells listeners that this is an APRS digipeater with MYALIAS set to RELAY.

Including the email address in the beacon message is also recommended, so that listeners can feedback reports and comments (particularly useful in areas where APRS coverage is sparse).

Weather Station Reporting

APRS position reports can also include the wind speed and direction, as well as other important weather conditions (Fig 11).

Some versions of APRS support a serial interface option to the Ultimeter and Davis home weather stations to do this automatically.

Weather stations show up as a blue circle. A network of these stations provides instant information on the progress of weather situations across the country.

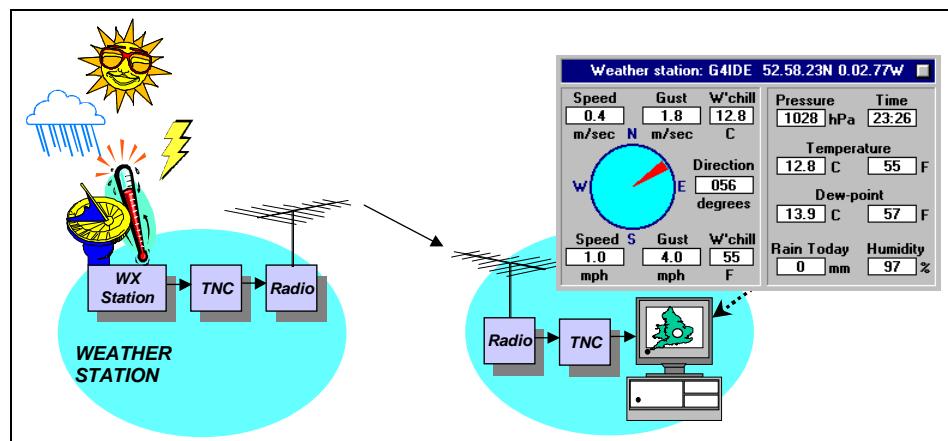
APRS has a database of the locations of most National Weather Service (NWS) sites in the United States and can process a file of NWS hourly weather conditions for display.

APRS users can also set weather alarms and be alerted when weather conditions exceed those values.

Weather systems and icons may be tracked as moving objects on the maps.

Fig 11

Weather information can be displayed by APRS



APRS Objects

The scenarios just described explain how APRS stations can *receive* information. In addition, APRS can be used to *send* information to other APRS stations.

For example, any station can place an object on his own map (Fig 12), and within seconds that object appears on all other station displays.

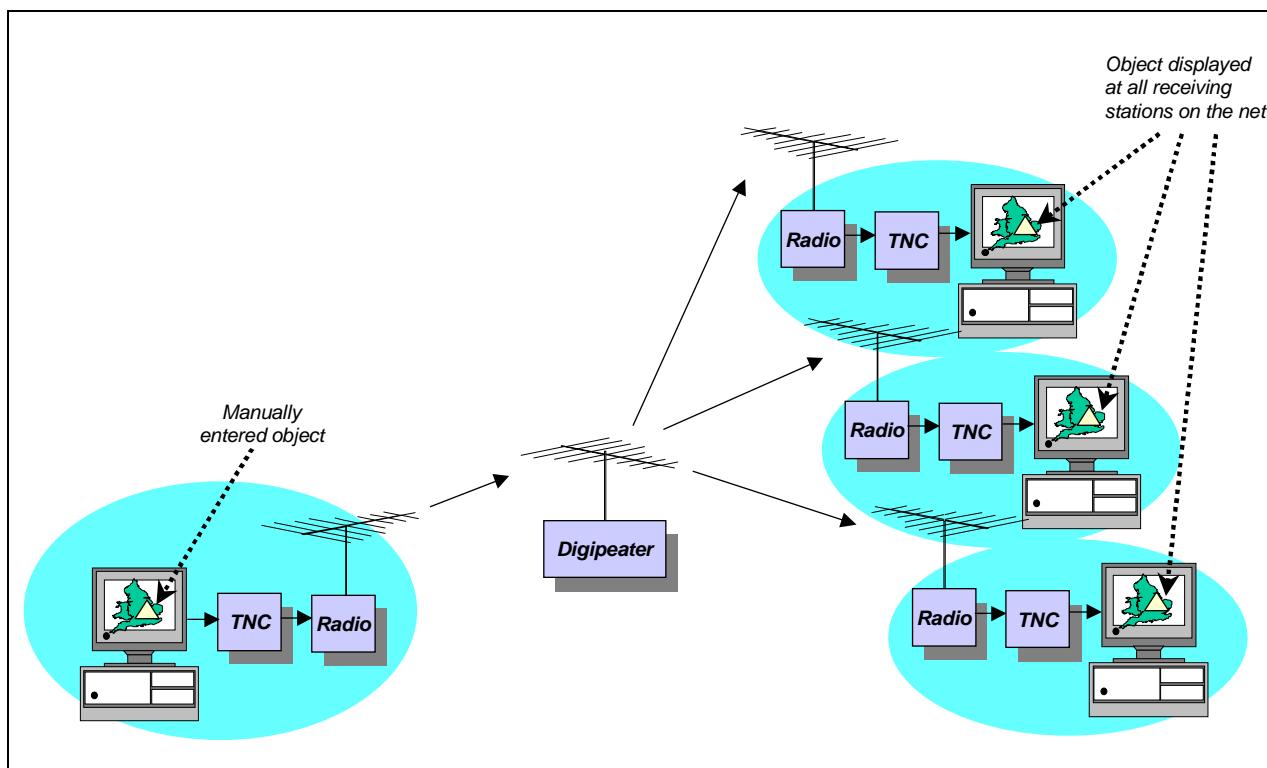


Fig 12: APRS lets a transmitting station manually add objects to a map, and all receiving stations will see the same object within seconds. This is especially useful in emergency situations, and in following activities such as marathons or cave explorations where it is impractical to equip participants with trackers.

APRS Messages

One of the most useful features of APRS is the ability to exchange short messages with selected stations — especially valuable in emergency situations. See Fig 13.

Messages are sent a line at a time as UI-frames, thus avoiding the overhead of conventional AX.25 connections.

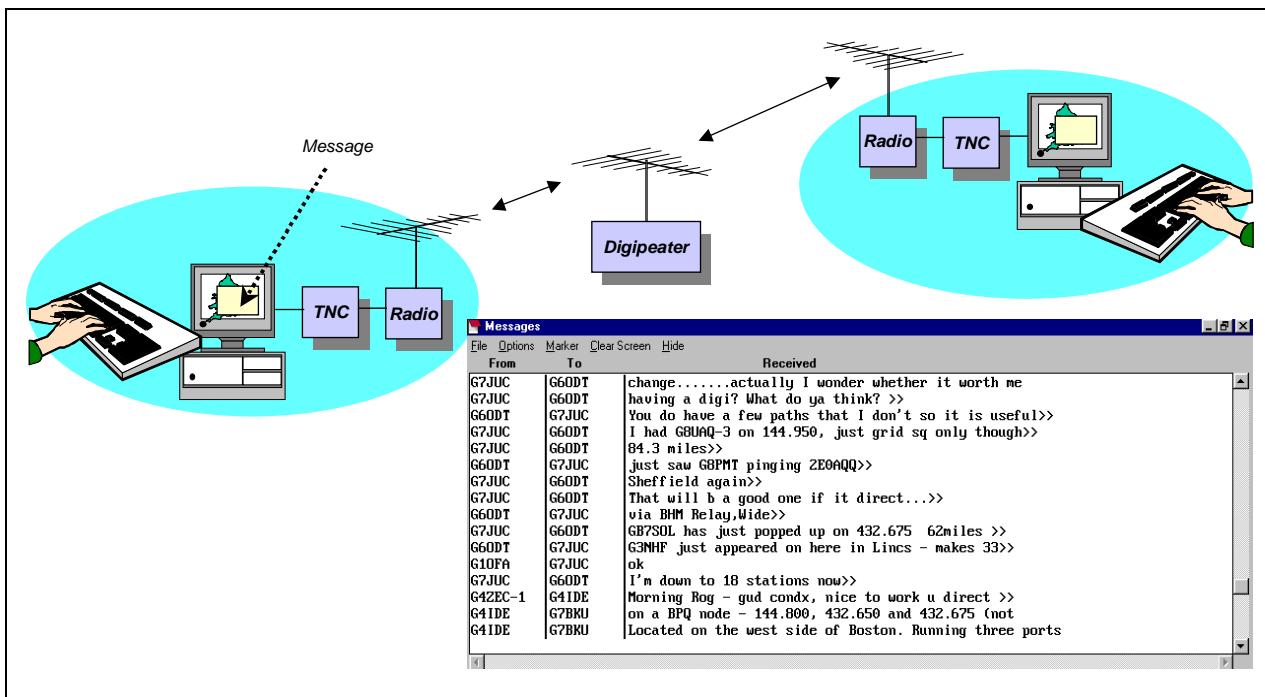


Fig 13: Two-way APRS messages. User friendly dialog boxes make it easy and quick to select the destination of each message, allowing several conversations to be conducted in parallel with different stations.

APRS Bulletins and Announcements

In addition to one-on-one messages, APRS also provides the capability of sending general bulletins and announcements to all stations in the net, again using UI-frames. See Fig 14.

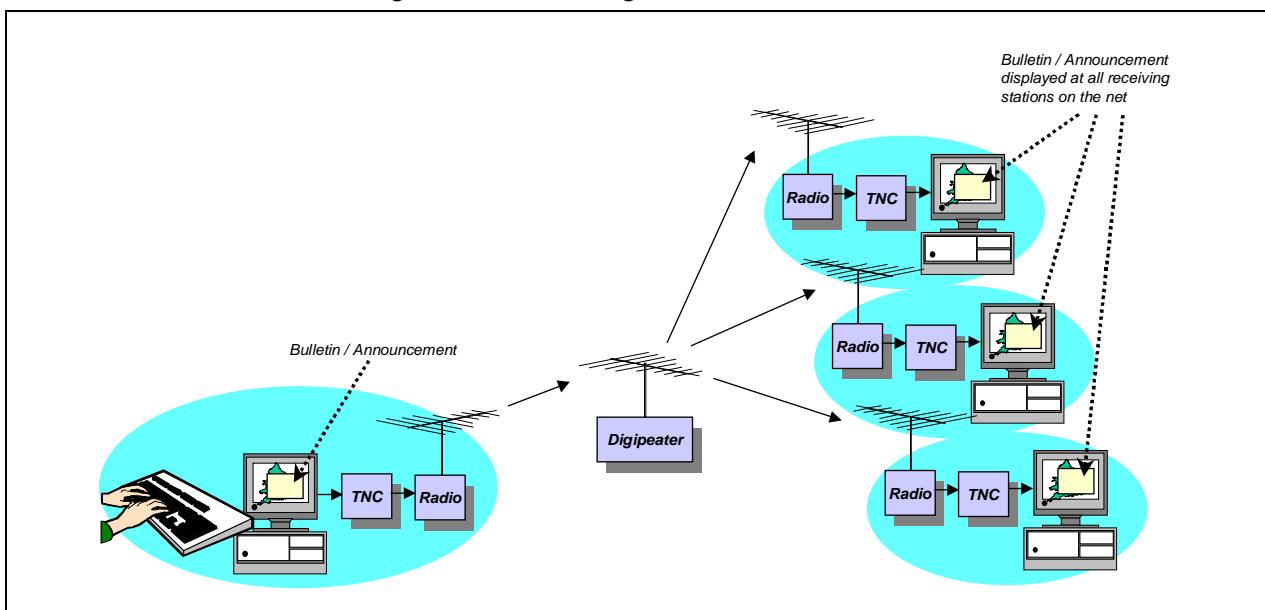


Fig 14: Bulletins and announcements allow information to be spread quickly to a large number of stations. APRS automatically sends bulletins every 20 minutes for four hours, and announcements every hour for four days.

APRS-to-Internet Gateways

As a further extension of APRS connectivity, APRS-to-Internet Gateways (IGates) send data between RF and the Internet. See Fig 15.

A station running IGate software receives APRS transmissions from trackers, weather stations and so on in the local area, and saves this information in an APRS database. Other APRS users can then connect via the Internet to the IGate, download the data from the database and display it on their PC.

The data is updated in real-time, giving users anywhere in the world an instant picture of what is happening in the vicinity of the IGate.

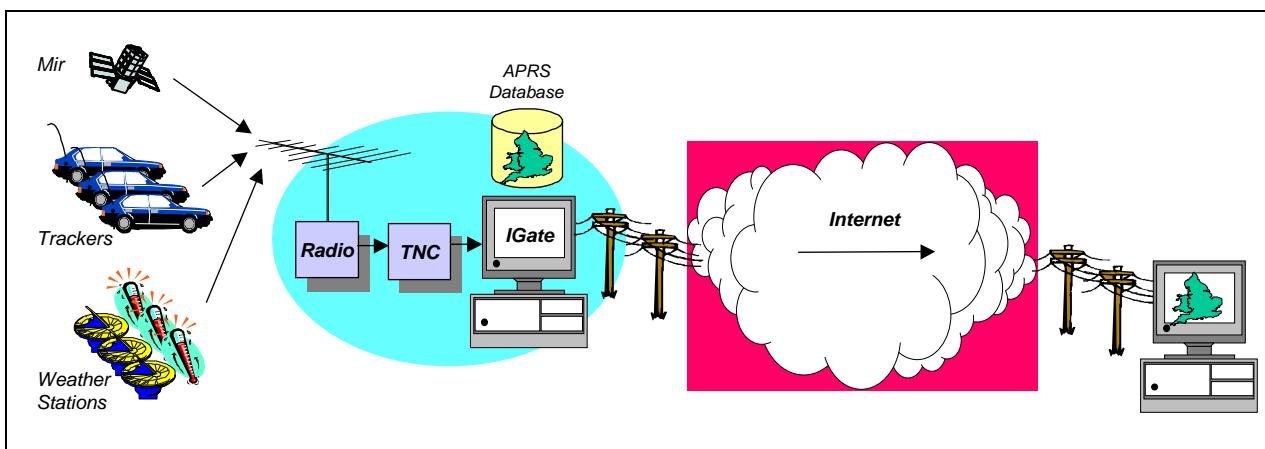


Fig 15:

Igate-to-Igate Connectivity

Further development of IGate software has led to individual IGate stations being able to share their APRS databases with each other across the Internet (Fig 16).

In this way, each of these collaborating IGate stations maintains a complete and up-to-date picture of all heard APRS stations. Thus all a user has to do is connect with one of these stations via the Internet to obtain a complete picture of what is happening instant by instant anywhere in the world.

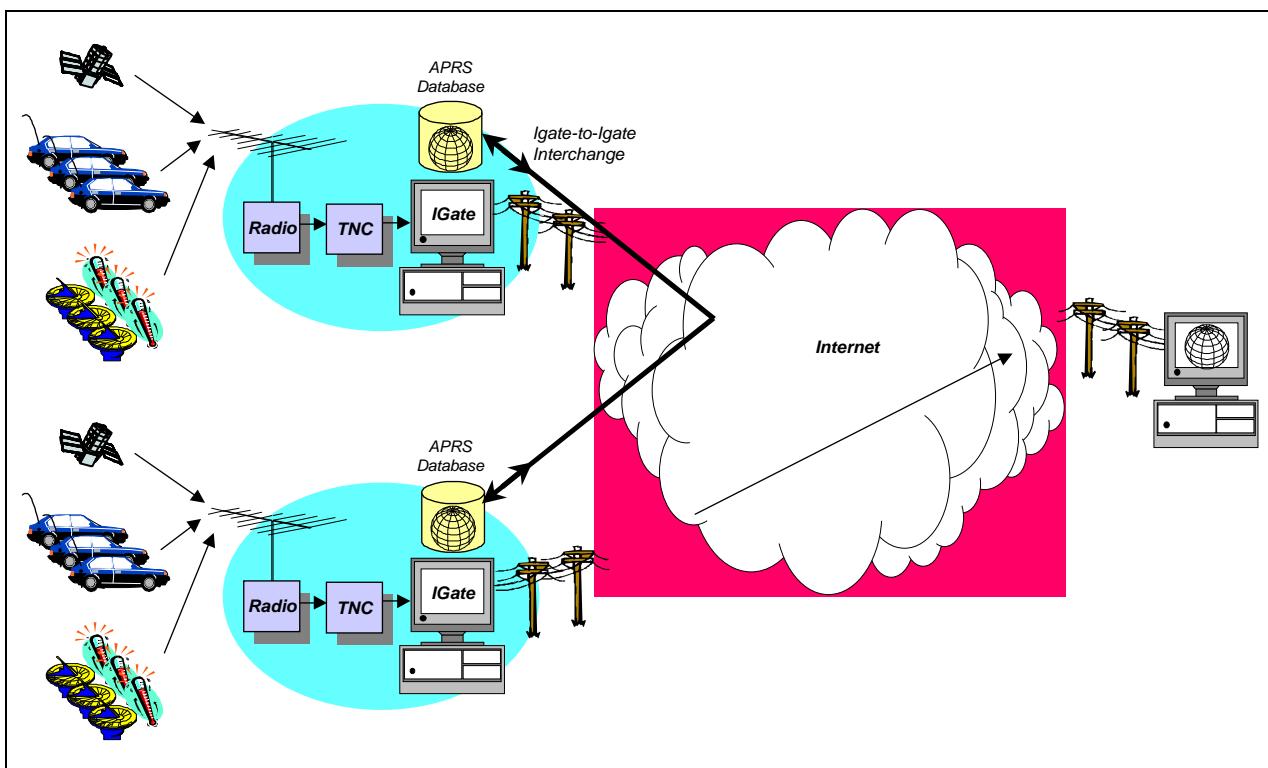


Fig 16: IGates can share their APRS databases with each other to build a composite picture of APRS activity. The network of interconnected IGATE stations in operation today provides end users with an instant picture of what is happening almost anywhere in the world.

Accessing an IGATE

An end user accesses an IGATE across the Internet using the normal APRS software, by dialing their local ISP and then clicking on an APRS button to set up a telnet connection to the IGATE. Station information will then be plotted on the map in the usual way.

The next two pictures show examples of maps produced when connecting to the APRSserve IGATE www.aprs.net in Florida.

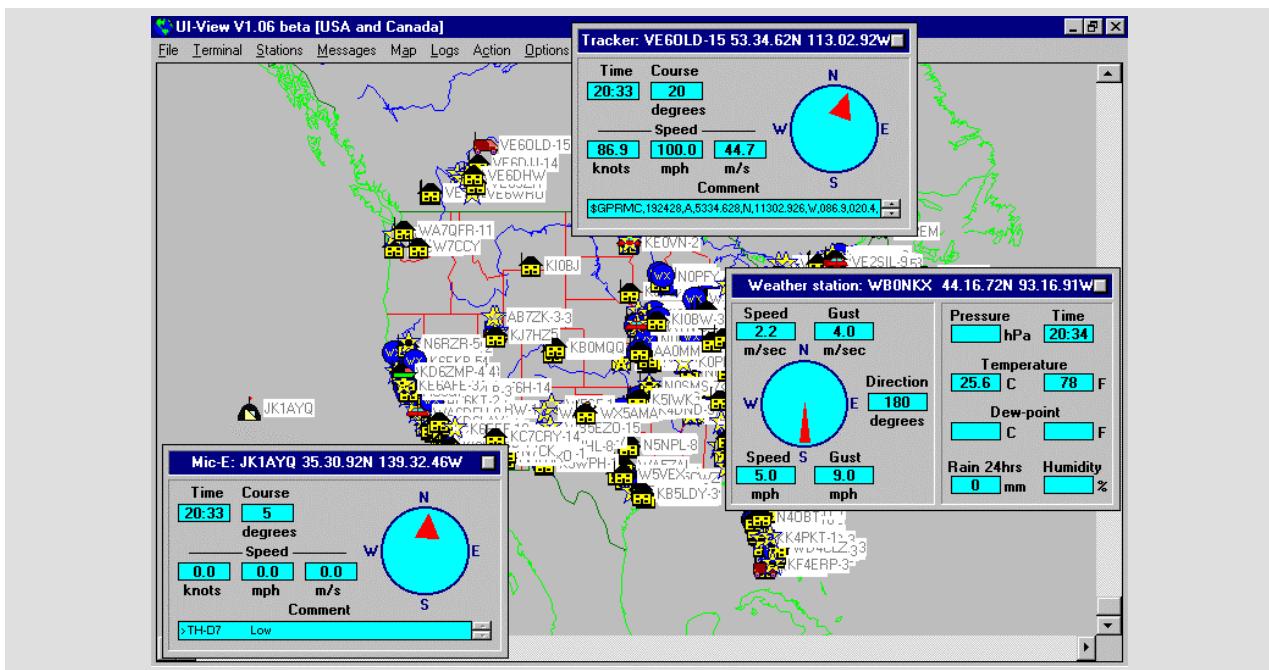


Fig 17: North America viewed via an Internet TCP/IP connection to www.aprs.net. Hundreds of stations become visible within a minute or so. Clicking on a station icon brings up details of the station — here, JK1AYQ appears to be going nowhere in the Pacific Ocean, at 139 degrees west (but probably should have set up his latitude to 139 degrees east), and VE6OLD-15 in northern Canada is steaming along at 100mph in his van...

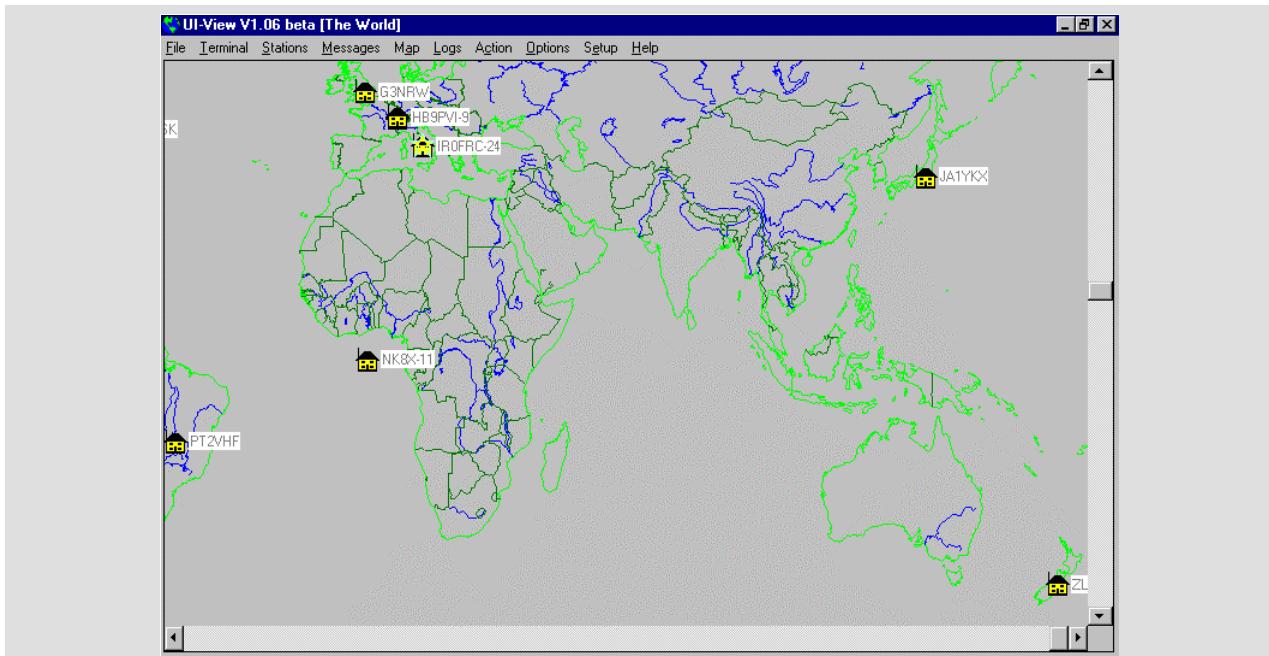


Fig 18: The rest of the world is a little quieter. ZL3TRX-1 in Christchurch, New Zealand is just visible bottom right. NK8X-11 is seemingly all at sea in his house off the West African coast — various stations occupy this spot from time to time, erroneously reporting their position as zero degrees latitude/zero degrees longitude (usually because of equipment malfunction or software setup error).

Accessing Raw APRS Data

It is even possible to access the raw data from an IGate server without using APRS, simply by using a standard telnet client.

For example, Fig 19 below shows a sample of data received when telnetting to www.aprs.net on port 10151.

This can be very helpful in becoming acquainted with all the different types of transmissions using the APRS protocol.

Fig 19

A standard telnet connection to an IGate across the Internet produces lots of raw APRS data

This example shows typical output when telnetting to www.aprs.net on port 10151

```
KE9QU-8>WIDE:!4308.95NN08758.98W#KE9QU-8, Milwaukee
N4UDE>APW227,AB4KN-2*,WIDE3:_06230522c139s004g006t069r000p000P000h00b00000wU2K
KE6SCS-5>BEACON,WA6QFT-3,W6CX-3*:=3720.50N/12159.06W#PHG0000/Steve in Santa Clar
a ke6scs@hotmail.com
KC4YDQ-7>APRS,W04JJ-3,N4WYK-9*/U:=3623.32NT08325.19W#PHG5620/W-R-TRACE-TN CLINCH
MTN
KC2BIA*>APRS,WIDE,WIDE:!4047.72NT07447.83W#/W-R Digi only -NJMORWASHTWP- O.E.M.
[N2QAE]
N80NI>APRS,RELAY,KB8GUQ-13,N8LXY-10*:@050553h4137.36N/08104.25W>330/000MIC/M0/0F
duty...
AJ4Y-9>APRS,K4LKL-10*,WIDE,WIDE:Pauls Tracker: http://map.aprs.net/aj4y-9
NWSPTC>APR831,AB4KN-2*,WIDE3-3:=3321.42N/08434.33W#N4YTR* NWS in PeachtreeCity,
Ga.
N80NI>TQSW3U,RELAY,KB8GUQ-13,NK8X-10*/1:'m\51#:>/
WU2Z>APM327,TCP IP*:<IGATE MSG_CNT=132
WQ10-3>ID,W1KRU-2*,WIDE:WQ10-3/R WIDE/D WQ10-4/B
N7LP-14>GPS,W7MOT-1*,WIDE5-4:$GPGGA,033228,3317.780,N,11200.705,W,1,01,2.4,312.7
,M,-26.8,M,,*70
KQ6EO>APR827,WIDE*,WIDE4-4:=3843.19N/12114.98W-Tom in Citrus Heights -827-
N0SMS-7>APRS,WIDE/0:=3704.18NT09431.81W#PHG5260/APRSDIGI JOPLIN M0/ 3.2/ 0/08:3
5
N80NI>APRS,RELAY,N8LXY-10,KB8GUQ-10*:@050555h4137.36N/08104.25W>330/000MIC/M0/0F
duty...
N80NI>APRS,TCP/IP,UE3TEJ*:@230115z4137.35N/08104.25W>330/000/Mic-E/M0/0FF duty>/
KD4QIA-7>PRX40,N4NEQ-2*,WIDE4-2:=3315.06N/08650.11W#WideDigi->Alabaster AL
W6APA>APRS,WIDE3-3/U:=3444.61NN11843.51W#PHG7690 Sandberg W-T-CA Digi APA Digital
1
K7GIL>APW227,KA6CYD-2,W6KRW-10*,WIDE,N7ZEV-1:_06230514c329s000g021t072r000p000P0
00h34b10107wU2K
```

Logging

Logging of transmissions is an important feature of APRS. Fig 20 below shows an example of replaying a log of stations in the area of the Wash in East Anglia.

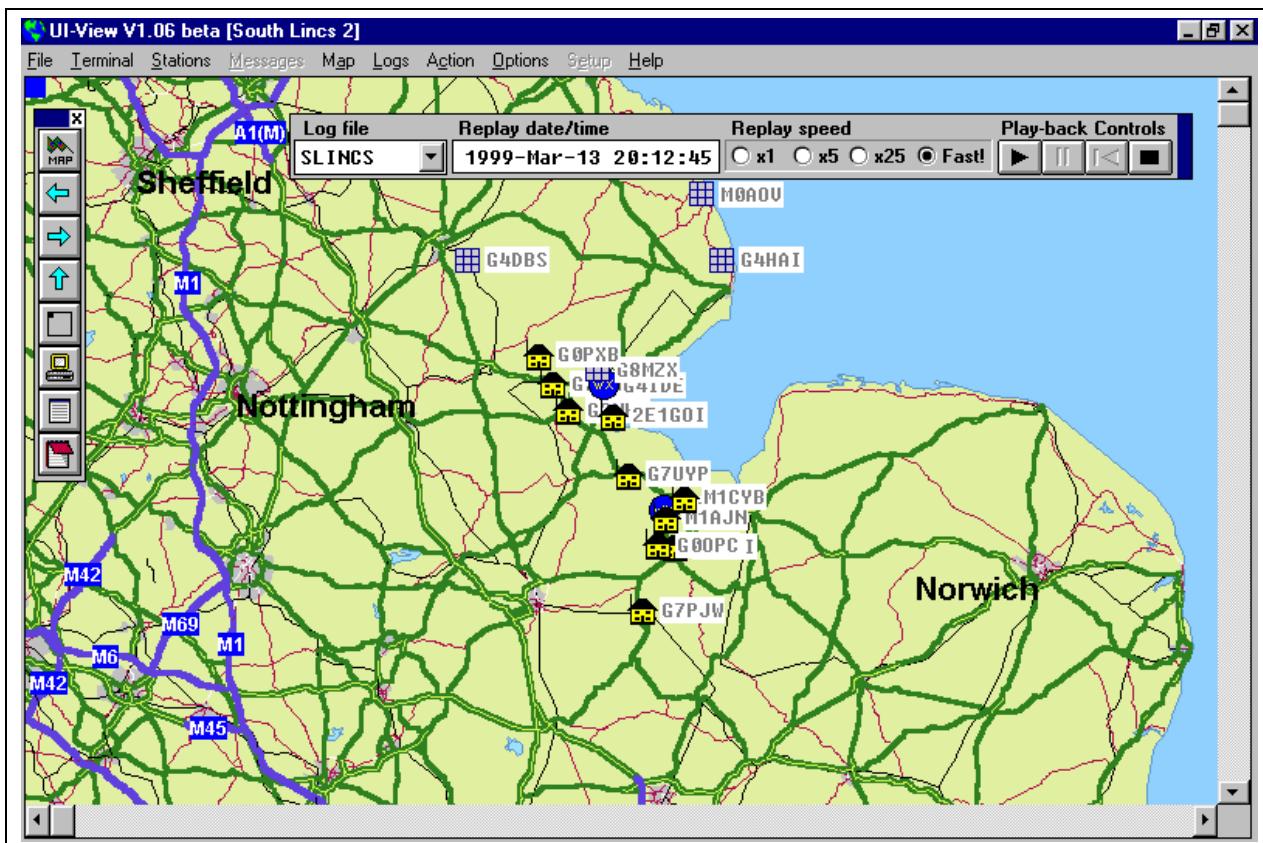


Fig 20: An example of a log playback of stations in in East Anglia. Easy-to-use playback controls allow replay at various speeds.

APRS Maps

APRS maps are available from various sources, but it is usually preferable to make a set specifically for a given location.

In the UK, probably one of the best sources of maps is the *Ordnance Survey Interactive Atlas of Great Britain*, published on CD by Attica Knowledge.

Using this atlas, making an APRS map is very straightforward. All that is necessary is to display the desired geographical area on the screen, then make a note of the lat/long coordinates at the top left-hand corner and bottom right-hand corner of the screen. The map image is saved as a .BMP file.

The final step is to create a three-line text file containing these corner coordinates, together with a brief plain-language description of the map.

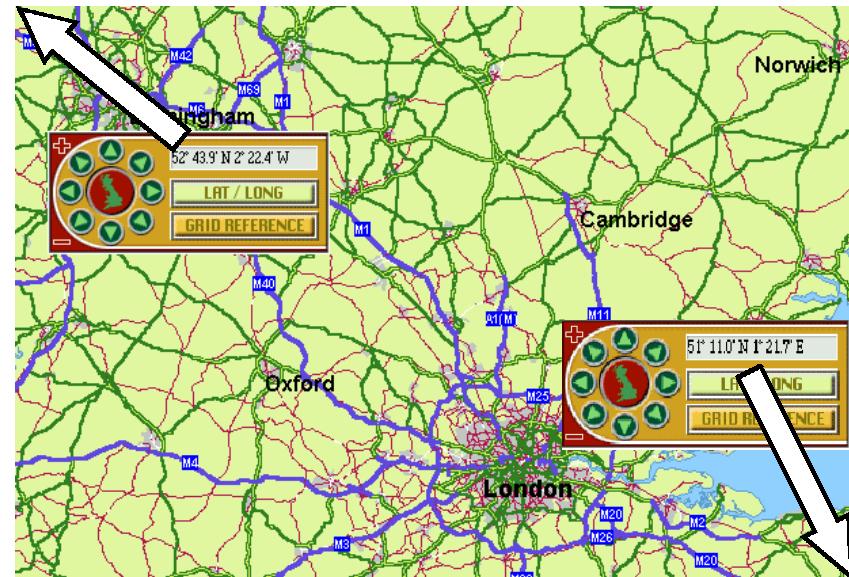
Fig 21

APRS Map Making.

The screen image is saved in a .BMP file, and the lat/long coordinates at the top left and bottom right corners are saved in an associated text file.

For example, the text file corresponding to this image would be:

52.43.9N, 2.22.4W
51.11.0N, 1.21.7E
G3NRW 60 miles



Where to find APRS

There are several versions of APRS available for different platforms. Here are some useful starting points for the software and documentation:

	Package	Internet Address
DOS	APRSdos	ftp://ftp.tapr.org/aprssig/dosstuff/APRSdos/
Windows 95/98	WinAPRS	ftp://ftp.tapr.org/aprssig/winstuff/WinAPRS/
	UI-View	mailto:roger@peaksys.demon.co.uk
Mac OS	MacAPRS	ftp://aprs.rutgers.edu/pub/hamradio/APRS/
Linux	Xastir	http://www.eazy.net/users/fgiannan/linux
Palm Pilot	PalmAPRS	ftp://ftp.tapr.org/aprssig/palmstuff/
All Platforms	Documentation	http://www.aprs.org http://www.dididahdahdidit.com http://www.tapr.org <i>N.B. Much of the detailed APRS documentation is only available with the APRSdos package (see the first entry in this table). Download this package to get the documentation, even if you do not plan to use APRSdos.</i>
TCP/IP (IGate access)		telnet www.aprs.net:10151 telnet www.ilnorth.aprs.net:10151

Mailing Lists

One of the best ways of keeping right up-to-date with what is happening in APRS is to subscribe to one or more of the APRS mailing lists. These include:

List	To Subscribe
APRS SIG	Go to http://www.tapr.org . Click on <i>Special Interest Groups</i> then Join APRS SIG
APRS UK	Go to http://www.onelist.com . Click on <i>New Member</i> and follow the prompts to subscribe to <i>APRSUK</i>
UI-View	Go to http://www.onelist.com . Click on <i>New Member</i> and follow the prompts to subscribe to <i>ui-view</i>

GPS Receivers

Almost any GPS receiver that has a serial interface conforming to the US National Marine Electronic Association's *NMEA 0183 ASCII Interface Specification* will work with APRS. The specification defines the formats of the data "sentences" which are transmitted as ASCII character streams, similar to the example shown earlier in this paper:

\$GPGGA,102705,5157.9762,N,00029.3256,W,1,04,2.0,75.7,M,47.6,M,,*62

The usual data transmission rate over the serial link is 4800 bps, and the receiver produces a new set of sentences every second.

GPS receivers which are known to work with APRS include:

- Garmin: GPS 20, GPS 25, GPS 35, GPS 45, GPS 48, GPS II+, GPS III, GPS III+
- Magellan 2000XL
- Rand McNally Streetfinder

This is not an exhaustive list.

TAPR can provide suitable receivers; see <http://www.tapr.org>

TNCs

Almost any TNC will work with APRS. However, if buying a new TNC, the Kantronics KPC-3 Plus (with firmware version 8.2 or later) is widely recommended, as it provides a separate port for a GPS receiver, and supports a number of advanced APRS-compatible extensions for intelligent digipeating.

Another alternative is to use the Kenwood TH-D7 2m/70cm handheld — in addition to the usual radio capability, the TH-D7 contains a built-in TNC with APRS support. This is ideal for emergency or portable work, and it is most impressive to witness APRS communications with Mir, using nothing more than just a TH-D7 held in the hand!

UK-SPECIFIC ISSUES

UK APRS Frequency	APRS only works best when all stations operate on the same frequency throughout the country — this lets mobile and portable stations travel over wide areas without having to change channels. The Americans discovered this the hard way, and it was only after a hard fought, year-long campaign that US-wide agreement was eventually reached for all APRS stations in the United States to QSY to the same frequency (144.390 MHz).
144.800 MHz	This frequency happens to be in the meteor scatter portion of the Region 1 bandplan, so an alternative frequency is used in the UK: 144.800 MHz . This frequency was proposed by the RGSB VHF Committee in June 1999 for “unconnected net” traffic (such as APRS), and is endorsed by the Data Communications Committee.
	All UK APRS stations are now encouraged to use 144.800 MHz.

Unattended Operation	The success of APRS will depend very much on setting up a national network of stations, most of which will be unattended.
	To clarify the position on unattended operation, the UK licence regulations — as specified in the <i>BR68 Amateur Radio Licence (A) or (B) Terms, Provisions and Limitations Booklet</i> — say in paragraph 2(5) that unattended operation of digital communications requires the licence holder to give “... at least 7 days written notice of the location, period of operation, frequency, power (dbW), identity of other users of wireless telephony who share the site and shutdown procedures to the Operations Manager of the local office of the Radio-communications Agency in whose area the operation is to take place.”

IN CONCLUSION

APRS will lead the Future of Packet Radio

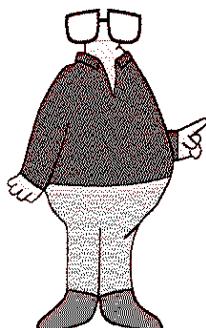
This White Paper has described the basic functionality of APRS, together with commentary on frequency allocation and unattended operation issues here in the UK.

In a document such as this it is only possible to scratch the surface of what APRS has to offer. It is without doubt the “killer” application that packet radio has been waiting for — in the words of the prominent Australian APRS advocate Darryl Smith, VK2TDS: *“I believe that APRS could be the mode that keeps amateur radio going for the next 10 years. A decade ago, packet radio showed all the promise. Now it is APRS. But unlike packet, APRS does not compete with the Internet. It works with the Internet, but does not require it. It can cope with thousands of users around the country on the same frequency, giving it an unrivalled user/bandwidth ratio.”*

APRS is very easy to get hold of, very easy to install and configure, and very easy to operate. It is not even necessary to invest in a GPS receiver at first to get going — a conventional packet station comprising a radio, TNC and PC is all you need to take advantage of much of the functionality that APRS has to offer.

APRS will undoubtedly take off in a big way in the UK in the near future, just as it has in North America, and there is plenty of room for everyone to make an original contribution to this most exciting facet of packet radio.

About the Author



Ian Wade was licensed as G3NRW in 1959. He originally became involved with packet communications in 1976 (as member of the design team for one of the first commercial satellite packet networks for Reuters), and as an amateur in 1984.

Ian was involved with BARTG for several years, and founded BARTG’s *DATA COM* magazine. He also founded the RSGB’s *Connect International* packet newsletter and the *Data Comms* column in RadCom. In addition, he is the author of the full-length book *NOSintro*, a beginner’s guide to using TCP/IP over packet radio — *NOSintro* has sold many thousands of copies worldwide since its publication in 1992, and is still the only reference work of its kind.

By profession Ian is an IT security consultant in banking, specializing in architecting secure solutions for electronic commerce over the Internet.

Ian can be reached on email at g3nrw@arrl.net.

END OF DOCUMENT