Frequency and Other New Initiatives in APRS since 2004

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Abstract: *Too many hams seem to have completely misunderstood APRS and think of APRS as just a vehicle tracking system that transmits GPS coordinates. When in fact, APRS is exactly the opposite. APRS is a receive and display system for the distribution and display of relevant immediate information of use to the mobile operator and others in VHF range. Now that we have another major manufacturer implementing APRS, it is time to get public perceptions back on track!*

My response to those people who think of APRS as a tracking system is that the tracking-only application is a relatively dead-end way of thinking about ham radio, and no wonder they are not interested, because in most cases, no one really cares where they are. But flip it around, focus on the receipt and display of local ham radio information and APRS represents the epitome of ham radio. It is receiving signals and information pertaining to every aspect of Ham radio in the immediate VHF surrounding area that is the joy of APRS. A single national calling channel and information resource to everything happening in the local area.

Key Words: APRS, Local Tactical Information, Frequency Reporting,

NEW INITIATIVES: Just driving down the typical Interstate, you are probably passing another ham in the other lane about one every 10 minutes? Yet how often can you raise anyone for a quick QSO? On the other hand, with APRS you can see them coming and make immediate contact, and you can also see what voice repeater frequency is recommended in the local area for travelers such as yourself.

Since about the year 2000, we began to integrate IRLP and ECHOLINK into APRS to provide voice as well as message connectivity between end users. Then starting around 2004, we realized that the public awareness of APRS was getting quite off track due to the proliferation of tracking devices and that we had to redirect the public perception of APRS back to its roots as an information receipt and display system. Most hams even in 2008 do not know that APRS operators have been able to use their radios for local/global text messaging and Emails for the last 10 years? This was long before the present teen-ager craze of text messaging on cell phones.

Figure 1. W4HFZ's typical mobile setup includes VHF, UHF, HF, a GPS and APRS.

In a time when overall chatter on the VHF FM radio channels is declining, this paper should shed some light on how we can find each other in the RF wilderness and communicate so much easier. Finding

each other is also important when there is a local situation, emergency, disaster, or simply when something exciting is happening that you want to share with others. We equip our cars with amateur radio technology, but are we really using it effectively?

National Calling Channels and Voice Alert: Of course, 146.52 is a good channel for the traveler, but when you are only in range of a passing mobile for about 3 to 5 miles and are passing at a combined rate of over a mile every 30 seconds, running into others on 52, would require everyone to be calling CQ every 2 to 3 minutes for their entire trip. This doesn't happen. But for APRS operators, there is an even better national calling channel on 2 meters that is far more active… 144.39 MHz.

APRS mobile operators can get dual-use from their APRS radios (see figure 2) by not turning the packet-racket volume down, but instead turning the volume up and muting the packet noise on the North American APRS channel by simply setting CTCSS 100. This mutes the packet noise, but makes their speaker fully ready to receive a voice call. We call this Voice Alert[R1]. It means at any time, anywhere in North America, you can make simplex voice contact with an APRS operator by just calling between packets by voice with CTCSS 100. This makes it possible to *always* be able to get in contact with the APRS operator in simplex range. Of course, as soon as contact is made, you must QSY to a packet free voice channel for the QSO.

Figure 2. For over 10 years, there have been a variety of fully integrated APRS radios as shown here. Shown left to right, first was the D7 and then D700. Then the DR-135 with add-on HamHUD to give it an APRS display capability, and then in 2007 the fully capable D710 and recently the VX8R.

Voice Alert Radar: But CTCSS 100 for mobiles has even better features. Since the APRS mobile has set CTCSS 100, this also means that his APRS radio is transmitting his local position packets marked with a TONE 100 tag on them. These TONE 100 packets are unique to all the other wall-to-wall digipeated packets on the APRS channel, because they are the only ones that are heard SIMPLEX DIRECT. This means that any other Voice Alert APRS station within simplex range (usually about 3 tc 5 miles) may occasionally hear the once every minute or so packet from another nearby mobile. This is

like a proximity radar Alert for another APRS operator nearby. This is better than "52" because these Voice Alert stations are automatically transmitting their "Voice Alert" radar ping CQ every minute or so. This guarantees you can't pass each other unannounced like "ships in the night"…

Voice Alert is not just for APRS operators. Anyone can use it, with any CTCSS equipped mobile radio. Just monitor 144.39 in North America with CTCSS 100 when on the open road and you will occasionally hear a few pings from any passing APRS mobiles looking for a QSO. When you hear one, just call QRZ by voice and ask him to QSY to 52 for a nice contact.

Operating Frequency Identification: The most significant new initiative in APRS is the addition of the FREQUENCY field. This allows all APRS operators to announce the voice frequency they are monitoring. Voice Alert only works simplex direct and is a great way to meet close-by fellow travelers on simplex, but sometimes it might be hours before you pass another Voice Alert station in simplex range, and then you are only in range for a 3 to 5 minute QSO.

By including the frequency of your voice radio in position packets, you make it possible for others to simply look at the station list on the front panel of the APRS radio or laptop or heads-up display (Hamhud) and see who is close enough for repeater contact as shown in figure 3. This extends the voice operating contact range to the typical hundreds of square mile range of voice repeaters, not just simplex of Voice Alert. The problem has been, however, how well the operators update their present frequency in their packets…

Figure 3. This D710 display list was sorted by callsign (W's) and station WB4APR-3 is a fixed station reporting that he is monitoring 147.51 MHz. Clicking on this list will reveal 3 more pages of info on that station, or you can just press TUNE button and talk to him if his repeater or frequency is in range.

Automatic Frequency Annunciation: In 2007, Kenwood solved the problem of frequency information latency by adding automatic frequency annunciation in the new Kenwood TM-D710 dual band radio. The operator can configured his status text to automatically insert the frequency of the voice band of the radio into the real-time position packets on the data band automatically. If the operator changes frequency, then his position report will have the new frequency!

This means that if you see another D710 operator on your APRS radio or see him on your GPS map, then his actual operating frequency is shown and you can QSY there to give him a call. As shown in figure 4, the wider screen of the new D710 has an added column to display the frequencies of other stations on the front panel.

Figure 4. The new D710 mobile radio adds a column for frequency info and also has a TUNE button for instant QSY to contact one of those stations. The first three objects are nearby voice repeaters, and AB9FX has two stations nearby, Another D710 monitoring 52 and his D7 HT monitoring 446.000.

Recommended Voice Repeaters Everywhere: In addition to the frequency of other operators, there are more frequencies on interest in the local area to tune! The most important local object should be the recommended voice repeater calling frequency for travelers in the area [R2]. You can see three of these in figure 4 and 5. These local repeater APRS objects include the Frequency right on the front panel list and when selected, even include the Tone, Net times, and meeting dates as well. Since these repeater objects contain a frequency, when you drive into a new area, you can just push the TUNE button to tune to the locally recommended voice channel.

Figure 5. By using the recommended local voice repeater frequency as an APRS object name, these recommendations show up for the mobile traveler whenever he enters a new area. This D700 shows the most recently received 146.76 is in direct range. The older 146.94 has moved down the list since it was heard 35 minutes earlier.

Echolink and IRLP Node Frequency Objects: Other frequencies of immediate local interest to the mobile traveler are the EchoLink nodes, IRLP nodes and Winlink Telpac stations. Echolink and IRLP nodes are shown on the APRS list as node numbers instead of callsigns to facilitate ease of use by mobiles as shown in figure 6 and include their Frequency, Tone, Range and Status (Rdy, Bsy, Lnk). With these VOIP systems and APRS, the infrastructure is already in place to make mobile-to-mobile real-time global communications possible. The APRS operator just sends a message requesting a call to station XXXX. An engine somewhere monitoring the APRS global data feed grabs this message, looks up the nearest VOIP node to the two mobiles, then sends a message to each telling them the frequencies. The operators tune to their local VOIP frequency and QSO. All we need is someone to write this AVRS engine software (Automatic Voice Relay System) [R3]

Figure 6. Nearby Echolink and IRLP nodes can also beacon their Position, Frequency, Tone and their node numbers. This makes mobile-to-mobile dial-up global communications possible. These displays show the node number and tone., but the second line should actually be the frequency.

Automatic Frequency Tuning: With the new TM-D710, you do not even have to push all those buttons to tune your radio to his annunciated operating frequency. If you select any station that is showing their frequency, and you have a D710, then you can instantly QSY to his operating frequency

by simply pressing the radio's front panel TUNE button. Done. Instantly you go to his frequency and tone and can monitor or start up a QSO. Not so obvious is the new SORT button which can SORT the list alphabetically or by range making it easy to find others. The above display is after an alphabetic sort so that all the Frequency objects show up at the top of the list.

APRS is *not* just a vehicle tracking system!

APRS was originally conceived as a local real-time information distribution and display system back in the 1980's even before GPS tracking was added [R4]. That is, APRS is a digital information channel monitored by everyone for distribution of short beacons about anything going on ***now*** in ham radio in the area.

APRS made it easy for anyone with new data to beacon it on the channel, and for everyone to receive, capture and sort it into a consistent set of useful displays. The 80's was a time when packet radio was spread out over dozens of local VHF and UHF channels with dozens of BBS's, DX clusters and nodes and so there simply was no simple way to get the big picture. APRS was designed to monitor any packet channel and to then build a database and a map of all the beacon information available. A scanning radio could gather all the information for the area, but could not mark the data by frequency.

So, to serve as a single resource, APRS established a continent wide single data beacon channel and invited all other systems to beacon their presence and activities there as a network of local information, not just APRS in-of-itself. Just knowing who was on the air was valuable information. APRS stood for Automatic -Packet- Reporting System. A universal channel network for local packet information (not Position reporting).

When GPS became inexpensive in the 90's, position tracking was added for those stations that were moving. This led to lots of APRS mobiles and in many cases the appearance to the casual observer that APRS was just a vehicle tracking system. Unfortunately, this is the ***wrong*** impression. APRS is about hams communicating with hams and being situationally informed about all ham radio activities around them. In the case of the mobile, it means receiving on APRS, information about everything around him that can be of interest to the local operator. For example:

What other mobiles are nearby?... Are there any traffic problems, or slowdowns? Where?
What is the current weather, N, S, E and W of town?... Are there any NWS warnings or watches? Where?
What repeater frequency are the others using for voice?... What IRLP, or EchoLink nodes are nearby?
Are there any SkyCommand basestations available?
Is there access to winlink or APRSlink? What frequency and where?
Is there any ATV on the air right now?... Are there any nets, meetings or gatherings in progress right now.
Are there any announcements or bulletins about coming events?
Are there any Amateur Satellites currently in view?... Is there any special DX coming in right now?
Is anyone sending me messages?
What repeater frequency is Joe on right now (a DTMF only user)?... Hey Joe, call me on 52!

Transmitting AND Receiving Local Info:

Not only are many people not aware of what they could be receiving in their mobile, but many that are using GPS trackers do not even receive APRS at all. There are very few ham radio applications that are based on transmit-only systems and APRS is ***not*** supposed to be one of them. APRS is a network for the two-way exchange of local relevant information. The purpose of this paper is to remind the general

ham population how useful this single channel digital information network can be to the mobile operator as a resource in not only maintaining situational awareness of all of ham radio around him, but also being a rapid keyboard messaging channel (think text messaging) and a national Voice Alert calling channel.

Many of the transmit-only tracking devices are being used with a transceiver but with the receiver turned off. This is a waste of a good receiver. The receiver should be set with a CTCSS 100 and the speaker volume turned up so that this person can receive a voice alert call from someone trying to contact him. Conversely, if any station is not listening they should never transmit with TONE 100 either. That is like calling CQ with no receiver to listen to.

Figure 7. This HAMHUD display shows that station KE4NYV is 141 miles north and is doing 63 MPH on a heading of 123 degrees. His device is identified as an OpenTracker2 (APOT2A). His position report includes his voice operating frequency as 146.52 with a tone of 107 Hz for voice contact. His position is translated to a waypoint and displayed on the map of the attached GPS.

Heads-Up Display: For other radios used for APRS, there is a kit available called the HAMHUD [R5] which can be connected to any radio so that it can not only transmit APRS, but also receive and display the local APRS packets as shown in figure 7. Early versions of the HAMHUD connected to a TNC which was then connected to the radio. But newer versions have the TNC built in for an easy one-plug solution. This is an inexpensive way to receive and display APRS local information while mobile.

Participating in the local Situation

Not just non-APRS users are mistaken about APRS as only a vehicle tracking system, tbut even some with fully capable two-way full function APRS radios such as the D700 are not aware of all these capabilities. This D700 family is a dual band mobile radio with detachable control/display head and built in APRS, but it is much much more. For example the following neat applications will be discussed in this paper. All of these are included in the basic radio requiring no external PC or laptop, and all of this information is available to the traveler on the front panel.

- APRS, map displays, APRS messages and Email
- Voice Alert (a *3rd band giving you a full time intercom channel to other operators)
- Proximity Radar alerting you to all other similar mobiles in simplex range
- IRLP and ECHOlink alerts to repeaters in range and their frequency and tone
- Satellite Alerts showing you FM mobile satellites when they come into view.
- Query/Response to the local area for locations of important local services or assets
- Winlink emergency access to your email
- DX Cluster spots to alert you to DX and other information on a DX cluster
- Remote control (sky command) of your HF or other remote base radio
- Direct control of SSTV if you have the VH-C1 handheld SSTV system

DSTAR Radios and APRS:

One area we are particularly interested in is how to display APRS information to the mobile DSTAR Digital Voice user. Of course the easy way, is to simply connect the RC-D710 stand-alone APRS Display Head to the audio DIN jack on the back of the DSTAR radio as shown in figure 8 and set up the left band of the radio to the APRS 144.39 channel.

The display to the right has the D710 display showing the Packet Monitor display just to show that it is receiving APRS packets on the left side of the radio. This solution is plug-n-play since most radios these days have the mini-din audio plug for external access to TX and RX audio.

Figure 8. The D710 display on a 2820 DSTAR radio!

The more universal method is to work with AA5PL's D-PRS system and display the information directly on the front panel of the ICOM 2820 radio, but there are issues about how to use this channel for distribution of local APRS information back to the DSTAR user. Right now, the DSTAR users are using their GPS mostly in TRACKER mode and the D-PRS system translates their information over to the APRS channel only.

GPS Map Displays:

Not only can you plug in a GPS and have the radio automatically transmit your positions and status as you drive, but the D7 or D700 or HamHud also converts all other packet positions it hears into objects for automatic display on the attached GPS map capability. Thus, the attached GPS map becomes your mobile APRS map display. It shows all surrounding APRS stations, mobiles, weather stations, and objects, right there on the GPS. With a good GPS with built-in maps, no laptop is needed in most APRS mobiles. Recently, the AVMAP G5 even includes the full APRS symbol set so these other stations appear on the GPS map with full color symbols as shown in figure 9.

Figure 9. GPS units attached to APRS displays convert all stations heard to waypoints for display. The new AVMAP-G5 when connected to the D710 even supports the full APRS symbol set so that the mobile operator does not need his PC to see the full APRS tactical display.

Instant Information Display

Each new incoming packet with new information flashes up on on the radio or HamHud screen for 10 seconds or so as shown in figure 10. In this way you are instantly alerted to anything new in range without your hands ever leaving the steering wheel. This display is useful for conveying to travelers the location and frequency/tone of the local calling frequency as well as all other assets. A new feature of the D710 is that the Display Head can be used as a stand-alone APRS display when hooked to the audio connections of any radio. This is useful when removed from the mobile and maybe carried inside to the club or EOC and operated with any HT.

Figure 10. Typical flashed display on receipt of a new nearby packet. This D700 display shows how the left side of the radio flashes each new packet momentarily. It shows why we like to concentrate information into the first 20 or 28 bytes of a packet so that it displays well on the 10x10 display of the D7 and the 10x10x8 display of the D700 shown here. Here we see the local repeater, its tone, its typical range, and its weekly net times.

If you miss any of these new items when they come in and are flashed on the screen for 10 seconds, you can always call up the list of the last 40 stations heard with just a press of the LIST button. In most cases the D7 handheld and the D700 have similar menu's and functions and features. Although the D700 has a much larger display than the D7, the display systems are very similar so that to the user, they are consistent in their operation. The new D710 has an even larger display and holds the last 100 stations or objects.

RADIO SETUP:

The best way to configure a mobile is to have one radio for APRS and Voice Alert and your other radio for voice. Or, rather than having two radios, the dual-band TH-D7 and TM-D700 series radios as well as the new VX8R have all three functions combined into one dual band radio. The best configuration for these radios is to dedicate Band A to APRS and Voice Alert on 144.39 in North America and then use Band B for everything else from 2 meters, 220, 440 through 1296, (though you can only transmit on 2m and 440).

Common APRS Settings: The common convention is to set your callsign with an SSID of –7 if you are using a handheld, and to use –9 for your mobile. Most of the APRS menu items are self explanatory, but the most important setting not found in the APRS menu is under the RADIO-DISPLAY menu where you should set the DISPLAY-MODE to 3. This puts the APRS softkeys on the front panel for rapid access to the APRS LIST and BEACON buttons which are the most useful to the APRS traveler. Without this setting, APRS functions are hidden from the front panel and are not as convenient as they should be. The D710 has a hot key to toggle between soft key menus without the press-and-hold function on the D700. There are numerous web pages with suggestions on setting up the various APRS radios for optimum APRS [R6].

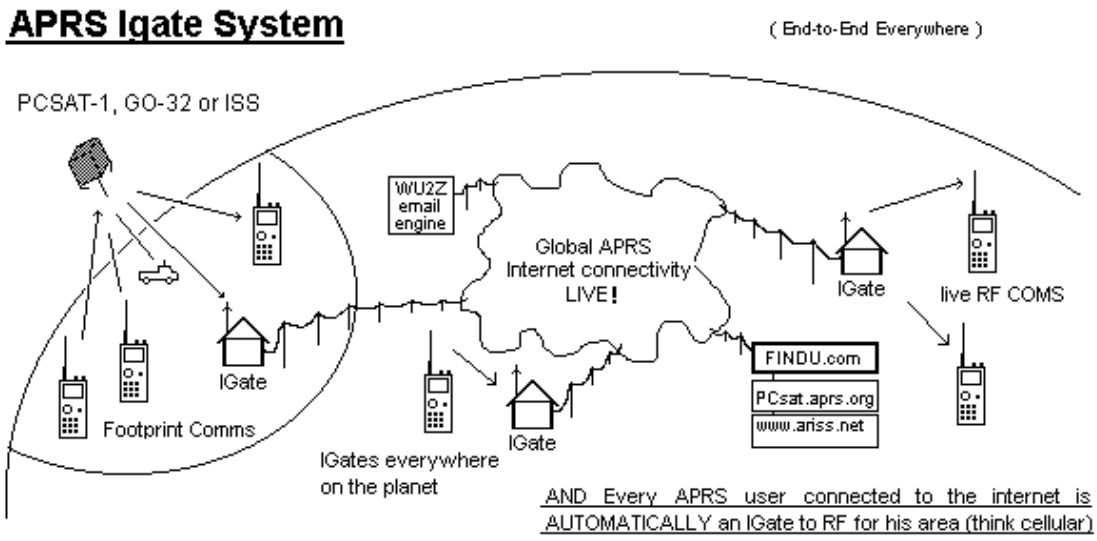


Figure 11. Although APRS is a local information resource, it has global connectivity via the free bandwidth of the internet as shown in the above figure. The primary function of the Internet backbone is to allow for end-to-end messaging between any two users by simply knowing callsigns. All APRS packets go into the global channel, but only end-to-end messages come back out to the intended recipient.

GLOBAL REAL-TIME MESSAGING: Although APRS on RF is only a local system, it is globally connected for station-to-station messages as shown in figure 11. APRS has had local and global text messaging for 10 years. This is because all APRS messages transmitted anywhere all get captured into the APRS-Internet system (APRS-IS) by home stations linked to the internet. If any such Igate anywhere sees the recipient of your message in its local RF area, it will automatically pull that live message packet from the APRS-IS and send it in real time to RF to the targeted user. His system will generate an ACK and the ack will travel the reverse route to the sender in real time. This is not Email. These messages are live. If the recipient is not on the air, the message dies. No routing information is needed, just the sender and receiver callsign. If both stations are on the air anywhere in the Global APRS system, their packets get to each other without any prior routing or address knowledge required. Messages up to 45 characters show up nicely on the D7 display as shown in figure 12.

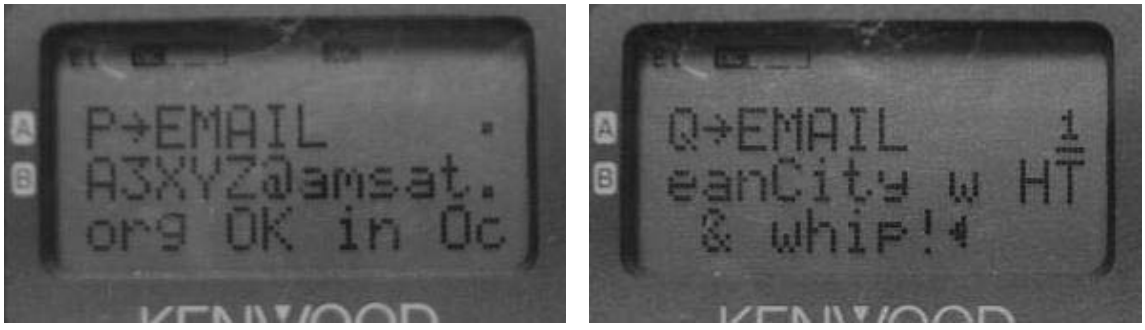


Figure 12. APRS messages are global and real time, as long as both stations are on the air. This message is not to another callsign, but to the pseudo-callsign of Email. This special call will be captured by the APRS-IS and turned into a standard Email for delivery to the indicated recipient.

WEATHER: A real advantage of mobile APRS for the traveler is the ability to look ahead and see the live weather conditions. Simply look on the APRS map or station list for an APRS weather station

ahead of you. The weather data can give you valuable information on a passing front, rapid temperature changes, or rainfall and high winds. The image in figure 13 to the right is a HAMHUD-2 showing a weather report.

Figure 13. This HAMHUD display shows an APRS weather station KB4TOH-3 reporting 28 degrees F, winds 5 MPH at 322 degrees and the station is 61 miles to the south. It was heard via the second hop (WIDE2*).

EMAIL: In addition to live real-time global messaging, you can also use APRS to send one-line email to anyone from your mobile, complements of the APRS email Engine maintained by the Sproul Brothers, WU2Z and KB2ICI. Simply address your normal APRS message to "EMAIL" and enter the email address as the first word of the message line. Their WU2Z Email Engine at Rutgers University (see figure 11) will capture the message and wrap it up as normal email and send it to the internet. The Email engine will also send back a confirmation that the Email was sent.

This Email capability is the basis for APRS emergency messaging in disaster areas or for first responders. This capability (including via the APRS satellites) make it possible to send an email from almost anywhere in the world at least a few times a day. Recognizing the great potential for this system, all ham radio operators are encouraged to transmit a simulated emergency tesst message via any of the APRS satellites at least once a month to validate their abilities. See http://www.ew.usna.edu/~bruninga/sset.html.[R7]

IRLP and ECHOlink SETUP: To have your local IRLP and Echolink nodes show up locally on APRS, there are two steps. First, in your IRLP or Echolink node software, enable the script that generates your node's APRS object onto the internet [R3]. Then contact your local APRS IGate operator and ask him to add the NODE name of this object to his pass-to-RF list. This way, your IRLP or EchoLink node will easily generate the object, but the local IGatge will put it on the air for you. These packets should only go ***direct*** or via ***one*** hop from the local IGate. It is important for Igates not to abuse these objects. If Igates transmit these objects over wide areas, beyond their immediate accessibility, then they are just adding QRM and spam to the channel and undermining the local utility of APRS. The coverage of these objects should be limited to only the area where these assets can be used directly.

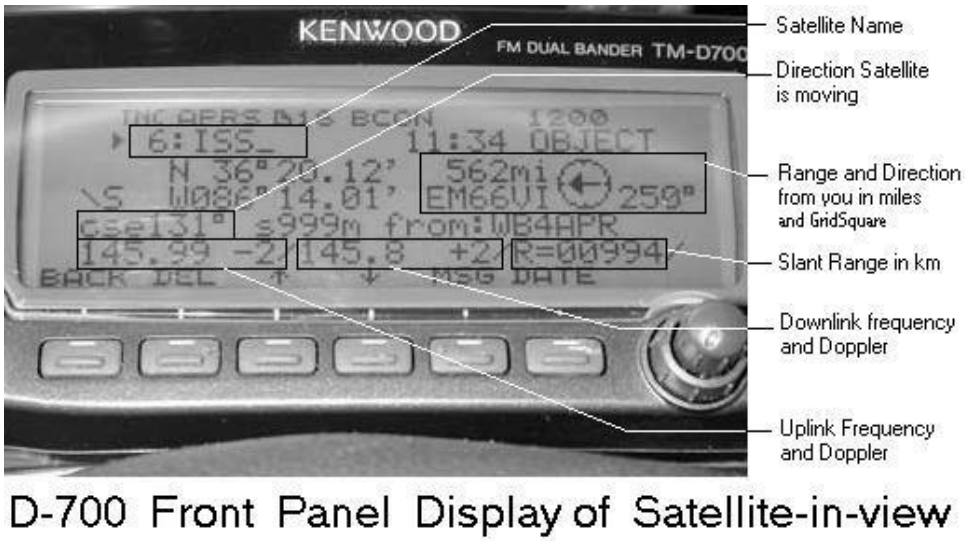
WINLINK EMERGENCY ACCESS: After the Katrina emergency where most of the email and commercial communications systems were wiped out, it became obvious that any APRS radio should be able to be used to send and receive email via the extensive Winlink email/packet system. Although Winlink is accessible via a TELPAC node with a PC connected to a packet station, in an emergency an APRS radio operator might not have his laptop with him. We needed an abbreviated method that could be used with just the keypad and front panel in emergences when an external PC was not available. We propsed this to the Winlink community and as a result, Lee Innman wrote APRS-Link [R8]. This software monitors the global APRS internet system and will respond to any APRS mobile radio that

sends an APRS message requesting to read his email. For more information on this capability, Google for APRSlink. Again, this is a last-mile, typically emergency access method since it uses the small display and keypad for communicating, but it works when you have no other method to get the email connectivity you need. To use this system, you must set up a free Winlink account if you want to be able to use the Winlink system.

SATELLITE ALERTS: Not only are there several APRS satellite digipeaters in space, but there are numerous satellites that you can operate FM voice too while mobile with your FM rig [R9]. The problem is that most of us are simply not attuned to the dozen or so passes per day when we could be operating the satellites if we just knew they were in view. It turns out, your APRS radio or HAMhud can instantly alert you and everyone else in your region any time an FM or APRS satellite comes into view. All it requires is someone in the area to set up a satellite-object server.

The satellite will appear like any other APRS object on the front panel of your radio showing you not only the callsign, name, location, distance and direction from you, but also it will show the frequency and even the current Doppler as shown in figure 14. In other words, everything you need to know on the front panel of your radio. In addition, once every 10 minutes a satellite schedule is transmitted to your mobile of any satellites that may come into view in the next 80 minutes.

Over the years, dozens of AMSAT satellites could be worked from the mobile FM rig including SAREX, ARISS, SUNSAT, ECHO, UO-22, UO-23, PCSAT1, PCSAT2, SO-41, SO-50, ANDE, RAFT and GO-32. Unfortunately, at this writing, only ECHO, GO32 and sometimes ARISS and PCSAT-1 can be used reliably for packet and AO-50, and AO-51 (ECHO) for voice.



D-700 Front Panel Display of Satellite-in-view

Figure 14. The D700 display showing the info displayed on an ISS satellite object. This info is updated once a minute if someone is running the APRSdata.exe program in the area. The bearing and distance are shown and also the uplink and downlink frequencies plus range.

Settings: Satellite Alerts are only visible if someone in your region is running an APRS data resource server such as the old DOS program called APRSdata.EXE. This program runs automomously at someone's shack keeping track of all the Amateur Satellites of use to mobiles. If anyone of them comes above the horizon in your area, the software begins generating 1 minute updates to an APRS object and transmitting this object out to the region. These objects will appear on the front panel of everyone's APRS radio or HamHUD display in the area as shown in Figure 14. On the D7 walkie-talkie display, the information is easier to see at a glance as shown in figure 15 and 16.

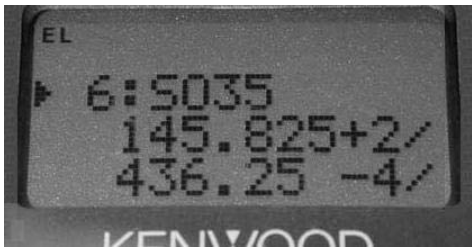


Figure 15. In-View Satellite data on the D7 screen shows the operating frequencies and present Doppler. Other displays on the D7 show the direction and distance.

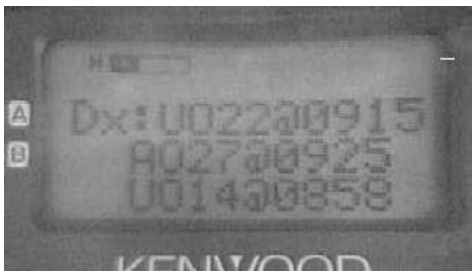


Figure 16. A special satellite schedule packet is transmitted every 10 minutes to update this display in the D7's and D700's DX list. It can show up to four of the upcoming satellite passes expected in the local area. This one showed the times of the next UO22, AO27 and UO14 satellites.

QUERIES: As long as someone is running APRSdata or similar local APRS server in your region, any resources in the entire area are also made available to mobile operators for query. There is no limit other than the data entered by the sysop of the APRSdata (or infoKIOSK) program. Typical queries, might return the closest Hospital, School, Fast-food, or even Radio Shack to you. Or any other data list such as the closet club, or EOC or fire station, or Weather station. The only limit is what the APRSdata sysop has listed in his APRSdata support files

TRAFFIC FLOW: Another useful application that was written back around 2000 would place objects on the APRS maps and mobile displays that would alert users to the speed of traffic past certain traffic speed monitors [R10]. Figure 17 shows how one of these objects displayed on the D7 mobile. This application runs on a local PC and monitors all APRS mobiles. Whenever a mobile passes one of these pre-determined monitoring points, its speed is recorded and turned into a fixed object at that point. These objects are transmitted once every few minutes for the next hour or so.

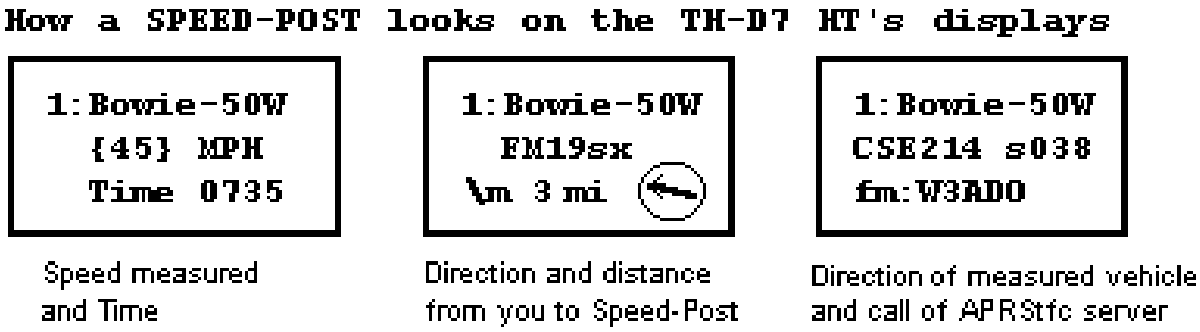


Figure 17. The speed post object shows the location by its name, the speed and the time. The radio also can display the direction and distance and the actual course and speed of the APRS probe car that instigated the report. This one shows that traffic west bound on Route 50 at Bowie is moving at 45 MPH at 0735 AM. This speed post is 3 miles to my west with traffic going by at 38 knots on a course of 214 degrees. (45 MPH).

WAYPOINTS, MAP MARKS, TRAFFIC ALERTS: Mobile Operators can even use their APRS radios to place APRS Objects on the maps of all APRS users in the area. This is useful if you want to report a traffic jam, an accident, a speed trap or anything else you want other APRS users to see on their maps. You do this by simply temporarily changing your APRS mobile radio callsign to the NAME of

the object you want to uplink. Include in your status text the nature of the object for all to read, and then transmit it a few times. This position report with the new NAME will appear on the map at your current location. Then be sure to change your callsign back to your call and keep moving. The NAMED object will remain on everyone's screen at its original position, even though you keep moving. This is simplified by setting something like ALERT-X as a permanent callsign in one of your program memories. The reason to randomly choose an SSID is because all ALERT objects from other mobiles will usurp each other unless they are unique. So choosing an SSID will reduce your chance of being usurped by a factor of 16 to 1. Or you can use other names such as MARK-N or SPECL-N, or LOOK-N or HERE-N. Because in the status text is where you will tell people what it is about.

Typically you might be mobile and mark an accident. Then you can tell other APRS operators by voice or by an APRS MESSAGE BULLETIN saying something like "Accident at my MARK-N". They can then see the MARK on their GPS map.

Remember, the APRS radios have several pre-programmed STATUS texts to choose from in each of the program memories (PM). If one of them is pre-loaded with "Accident @ my MARK-N" then you can post this object with only a few button pushes. One to select the PM with the MARK-N callsign and another to select the pre-programmed status text. Done.

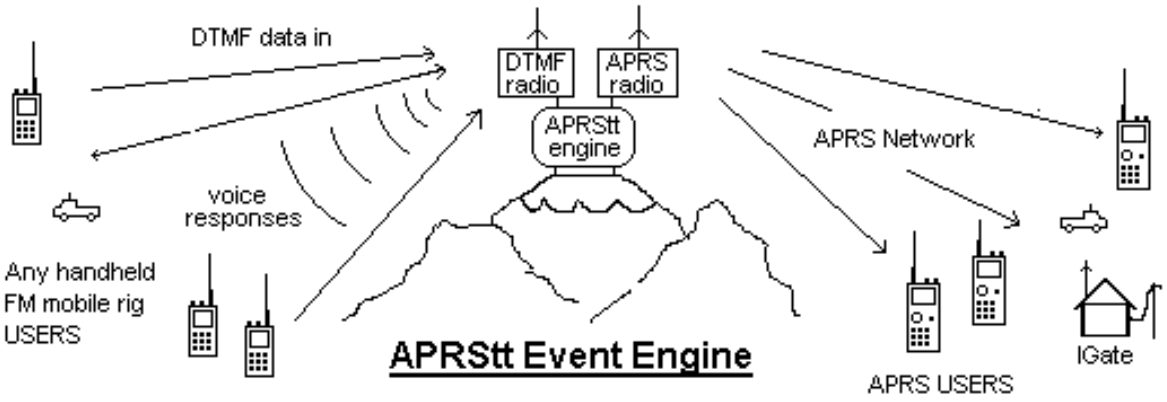


Figure 18. With APRS-touchtone conversion software at voice repeaters or special events, anyone with a DTMF HT can check-in to the global APRS system by just pressing a DTMF memory button.

APRS Check-ins Using Any DTMF Radio.

At the 2001 RAC convention and then at Dayton in 2002, we introduced the capability to convert DTMF tones from any handheld or mobile radio to APRS information as shown in figure 18. This capability called APRS-Touchtone or APRStt™ [R11] has the potential to revolutionize Ham radio by letting anyone with a DTMF radio check-in to the APRS system, not just those with an APRS radio. By just keying in one's callsign into a DTMF memory only once, then one can check-in to APRS at any time with just a single key press.

Just a callsign heard on DTMF on a repeater conveys almost 90% of what is important in APRS. Hearing that DTMF string, the APRStt repeater can forward all of the following information into the global APRS system:

- Callsign, Date and Time of checkin
- Position (shown within the 1 mile vicinity of that APRStt repeater)
- Frequency, Tone, or DCS
- Reverse patch, Echolink or IRLP node number
- A few bytes of DTMF message if needed

Not only is all that information now available to the APRS system, and nearby local APRS operators on the front panel of their radios, but anyone in the world can see that DTMF station on the global APRS system.

Once anyone is heard within the global APRS system, all their information is available live on any of a number of APRS-Internet resources such as FINDU.COM. Just a simple check of http://map.findu.com/callsign* will reveal all that information on any APRS station or object.

CONCLUSION:

Many of us only have time to really enjoy ham radio while we are mobile. The purpose of this article is to make sure everyone is aware of the vast potential of information out there that should be made available to the mobile operator on his front panel screen. Due to limited space, only a few of the dozens of display screens and data formats could be shown in this article. Think of these APRS mobile displays as Tiny Web Pages of Local Live information [R12] everywhere you go. Compared to cell phones, the big advantage of ham radio is it's one-to-many access to information. But just like a dead-band, there is only information to receive if someone else is transmitting it.

So think outside the box. APRS has been available as this local information resource for over 15 years, but many operators are still not taking advantage of this valuable local and global resource. Think about what info you can put out in your own immediate simplex range neighborhood that would be useful to the traveler or visitor. But be considerate. One area's local information, if received somewhere else, is SPAM!

References:

[R1] Voice Alert Web Page: http://aprs.org/VoiceAlert3.html
[R2] Local Repeater info: http://aprs.org/localinfo.html
[R3] Echolink and IRLP on APRS: http://aprs.org/avrs.html
[R4] The original APRS web page: http://aprs.org/aprs.html
[R5] HAMHUD web page: http://www.hamhud.net/
[R6] Setting up the D700: http://aprs.org/txt/D700-faq.txt
[R7] APRS Email Emergency Tests: http://aprs.org/sset.html
[R8] APRS link to Winlink: http://www.winlink.org/aprslink.htm
[R9] APRS Satellites: http://www.ew.usna.edu/~bruninga/astars.html
[R10] Traffic Speed Reporting: http://aprs.org/traffic.html
[R11] APRS Touchtone: http://aprs.org/aprstt
[R12] APRS Tiny Web Pages, 19th ARRL/TAPR Digital Conference Proceedings, September 2000, Orlando Florida. Pp13-20.