

Universal Ham Radio Text Messaging

www.aprs.org/aprs-messaging.html

A Programming Opportunity for TAPR

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Although most people think of Text Messaging as a recent phenomenon, they do not realize that amateur radio has had text messaging for over a century. This was recently well demonstrated on the Tonight Show with Jay Leno when two old hams using CW beat the socks off of two hip teenagers using text messaging on their cell phones. [0] Even though CW has yielded some turf to newer digital modes, amateur radio still relies heavily on an abundant tool box of instant text messaging capabilities. I recently counted over two dozen such systems currently active on amateur radio.

The purpose of this article (a shortened version appeared in the September, 09 QST) is to not just review this broad capability, but in so doing, to inspire us to write interfaces and middleware to tie these systems together where possible to meet the following objective:

Anytime, anywhere using any device, any ham can send a text message to any other ham by callsign alone using any digital device he may have in his immediate possession.

We are not just Hams with single focus interests, we are communicators with experience, resources, intuition and initiative to help establish communications anywhere at any time. Although we have our own frequencies and radios, our diversity of frequencies and systems and software is not just our best asset, it is also our worst curse. With 1000 frequencies on HF and 2000 channels on VHF/UHF below 500 MHz, plus dozens and dozens of software packages, how can we find each other or message each other when needed? The ambiguity is not just in the dimension of frequency and system, it is in space and time as well. About the only nationally recognized contact capabilities are the 146.52 and 446.0 National calling frequencies and the continental wide APRS packet messaging frequency of 144.39 MHz.

After 9/11 and Katrina it was clear that amateur radio needs immediate responsive communications to simply locate and establish initial communications. Systems like APRS and Winlink among others provide excellent tools for mutual exchange of information, what is needed for emergent contact anywhere, anytime is a *local* and *global* Text-Messaging -by-callsign- capability that makes it possible to connect people independent of frequency. Fortunately, this instant contact across the dimensions of space, time and frequency has been in APRS since the 1990's, and it is so powerful because it is all done on a single local/national APRS calling frequency; anytime, anywhere. We just need to link this system to all other ham radio texting systems, not just APRS to make this an all-ham radio system..



A previous article[1] summarized all of the capabilities of specialized mobile and handheld APRS radios as shown above, but now we want to address how mobile and handheld text messaging at least for the purpose of initial local/global contact can extend not only to *all* ham radios, but to all manner of personal electronic systems, cell phones, Ipod's, Blackberry's and more.!

Surely, every Ham radio operator can find at least one of the following techniques, devices or systems to establish communications with other hams anywhere, anytime. The following general categories will be addressed:

- **ARRL Email System:** ARRL members can have a callsign alias email address at arrl.net
- * **Organic Packet Systems:** Existing APRS and Winlink systems can send and receive messages
- **Other Radios:** Other text messaging systems exist that can be gated to APRS
- **Other Devices:** Cellphones, etc and other handy devices to TX/RX APRS messages
- **APRS => Email:** Sending an email from any APRS or compatible system
- **WEBpage => APRS:** Amateurs using Browsers to send into the APRS system

- **SMS** => **APRS:** Global text messaging to APRS users
- **EMAIL** => **APRS:** Global Email to APRS users

ARRL CALLSIGN EMAIL REGISTRATION: Fortunately, the ARRL has greatly simplified the end-to-end connectivity of ham radio operators by providing an email-callsign registration service. This registration allows members to associate an email address with their callsign so that they can receive email from anyone who only knows only their callsign. Similarly, AMSAT and other ham radio organizations also provide this service. With these services, global internet email, and global APRS message delivery, and text messaging on cell-phones and other hand held devices is possible making end-to-end text-messaging a reality. But we can still do more to make these systems work more seamlessly.

ORGANIC APRS MESSAGING:

First of course, are all the APRS radios. As discussed in the previous article, APRS client software and APRS built-in radios are designed specifically to send and receive messages on their front panel. In the figure 1 below, on the TH-D7 handheld, to send a text-message just press the MSG button, select INPUT on the MSG Menu, select an existing call or enter the callsign of any APRS ham radio operator anywhere in the world and your message will be delivered in real time via the local/global APRS system.



Figure 1. This shows the message menu and a typical APRS message. In this case, instead of a message to a callsign, it is a message to EMAIL which causes the APRS system to convert it to standard email for ultimate delivery. The actual email address is included as the first word in the message such as A3XYZ@AMSAT.ORG as shown here. The text is “OK in OceanCity w HT & whip!” which I was using for a satellite test.

Normal APRS messaging is just like text messaging in that it is sent and received in real time. Fortunately, APRS also provides many links between live messaging and email as well. Simply address the message to the word EMAIL instead of a callsign, and make the first text of the message be an email address followed by your message. If your email is digipeated, then you will see MY MESSAGE flashed on the screen indicating success.

TEXT-MESSAGING with ANY RADIO:

But it is not just APRS radios that can be used for text-messaging. The HAMHUD device is an add-on to the speaker-mic of any radio shown here. It gives a plug-n-play solution that brings full APRS functionality including text-messaging to any radio. In addition, the new Kenwood RC-D710 APRS display head can be purchased separately from the TM-D710 radio and can be plugged into the external audio interfaces of any radio. All of the APRS hardware and functionality is in the display head itself! In the small figure above it is shown plugged into an inexpensive \$88 Alinco HT to provide front-panel APRS and text-messaging capabilities and email to the operator.



PAGING RADIO MESSAGING:



In addition to the APRS radios and add-on hardware for other radios, there are other radios with built-in text messaging capability. The FT-51R family and TH-78A radios (from the 1990's) shown here have a built-in TEXT messaging and paging function that can also be used for messaging. Messages are entered from the Keypad and displayed on the radio front panel (shown at left). A user of these radios when traveling could just set his radio on a National Paging Radio simplex channel. There he could receive any local



information such as the locally recommended voice frequency for travelers as well as receive any personal or local text-messages. He could also send in his callsign and request any pending messages. A simple gateway program in the area could convert all paging text messages and local information to and from the global APRS network. My estimate is that there are more than 300,000 of these radios out there somewhere worldwide.

DCS-Text Messaging Radios: . Still newer radios use the DCS codes to send and receive text messaging. Again, gateway software can be written for these radios as well so that they can send and receive ham radio text messages with not only themselves but any other ham radio, APRS radio, DTMF radio, Cell phone, Blackberry or what have you. Known radios with the DCS-Text Message capability are the VX-8R, VX-3R, and FTM-10R/SR.



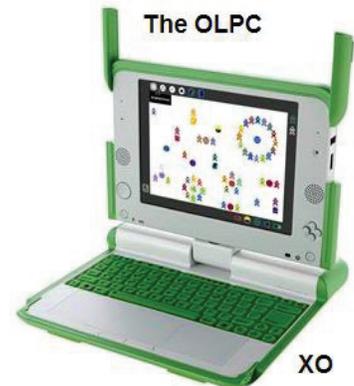
MESSAGING ON ALL OTHER DTMF HAM RADIOS:

Since 2001, we defined a DTMF communication method to interface any DTMF radio to the APRS system called APRStt (touchtone)[2]. This DTMF Messaging and signaling method extends basic information exchange to all radio amateurs with a DTMF HT, not just those that are APRS equipped. Data or messages are entered on the keypad and all data and messages are returned to the user by voice synthesis. Even the old-timer that shows up with his venerable IC-2AT as shown here to the right, for example, should be able to participate in any APRS supported event or receive his text messages. With is key pad, he enters his callsign into a DTMF memory, and whenever he is mobile, he can send out this ID string, and not only will he appear in the global APRS system, but he will also be able to receive any incoming text-messages. Since these radios do not have any text displays, the text-messages are read to him by the APRStt voice synthesizer. Think of getting your text messages similar to how you play back voice messages on your telephone answering device. A new version for Windows called Radio Spotter [3] using only the sound card has now been written by Rick Ruhl W4PC of CSS and demonstrated at Dayton 2009.



MESSAGING ON PALM-POCKET-and LAPTOP DEVICES:

Many amateur radio operators carry a variety of personal computer systems that also provide personal communications whenever the device is in range of a WI-FI network. These stations may also maintain amateur radio connectivity and text messaging via a variety of application programs. Shown here to the right is the application called APRSXO which gives full APRS message capability to the One-Laptop-per-child XO laptop. This interface not only provides the APRS text-messaging capability but also provides an approximate geographic position into the APRS system as well. This text-messaging activity was written by Jack Zielke, KG4GJY. See the web page [4] for installation and operation.



APRS EMAIL MESSAGING TO ANYWHERE:

In addition to conventional APRS text messaging, any APRS station can use this capability to send brief email messages via APRS to any cell phone or Internet user as well. The technique is extremely simple. Just address your APRS message to one of the Email engines below and make the first word of the message be the intended email address followed by the message. This is automatically picked off the APRS-Internet-System (APRS-IS) by the email engine and sent via conventional email. The sender receives an APRS ack for the message. An example email was shown also in an earlier paragraph.



* WU2Z Email Engine: The original APRS Email system. Send to "EMAIL"

- * AE5PL Email Engine: Send to "AE5PL-EM".
- * APRSlink on WLNK-1: Send to "WLNK-1" using the "SP" command [5]

Of course this process is greatly simplified for all radio operators that have registered their callsign with the ARRL, because they are accessible then by callsign@arrl.net alone.

INTERNET TO APRS MESSAGING:

Although sending email from any APRS client to any other ham radio operator anywhere in the world is easy as noted in the previous paragraph, there are different issues when sending general email from the internet back to APRS because of concerns over security and FCC rules. At present, there are a few methods for sending text-messages from on-line APRS-Internet (APRS-IS) systems to APRS mobiles and handheld operators. Because of the issues of security and license integrity, we hope that such systems implement the full APRS message mechanism to assure reliability and accountability listed in the reference[6]. Here are some existing systems:

- **FINDU.COM MESSAGING**, The original APRS on-line global information system called FINDU.COM written by Steve Dimse, K4HG now supports web based messaging. His page provides a link [7] that allows you to send a message from your browser to any APRS user.



- **OPENAPRS.NET** – Another global APRS on-line resource was written by Greg, NV6G. [8]. Greg reports that OpenAPRS.net has full messaging support since August 08. Just signup for an account (which is free), messaging is under the Tools window which is accessed from the right icon bar. OpenAPRS includes a "Friends List" that will display when OpenAPRS has detected one of your friends sending APRS messages to let you know when they are online.



- **WINLINK EMAIL** - An APRS interface has been added to the Winlink system so that any APRS radio can be used to send and receive Email via the Winlink system. This interface requires no software or special interface, it is simply a technique that any APRS radio operator can use to log in and send/receive email. This system is called APRSlink and was designed by Lee, K0QED. Normally, Winlink requires a special program or packet system to check for messages. But with the APRSlink[9], any APRS radio can be used to check messages or send messages from the front panel of the radio.



EMAIL MESSAGING FROM CELL PHONES:

The Internet Browser to APRS systems mentioned in the previous paragraph allow text-messaging from any computer WEB Browser or APRS radio to APRS message. But the final key element in the Universal Text-Messaging system for Ham radio is the ability to originate email from any system and have that arrive on the front panel of any APRS radio or other amateur radio text messaging device. This is a harder nut to crack, since it has to be fully functional for email, and yet be secure from all the SPAM and other malicious trash that can arrive in someone's email-box. Some individuals have written individual programs to take their incoming email and filter it and send it over APRS to their mobile, but none have been released for general purpose use. The overall objective is to send and receive text-messages no matter what the device and no matter where they are. This includes cell phones, palm-tops, blackberry's, pagers, and any other portable device. A few systems are in work.



APRS MESSAGES TO YOUR CELLPHONE:

N3FLR Frank Rossi reports that he receives all his APRS messages via his cell phone. First he set up the RSS capability [10] at FINDU.COM so that his computer can watch for any APRS messages to him. Then he set up YahooAlert[11] for a pager, and used his phone's text e-mail address (such as xxxxxxxxx@txt.att.net) as the destination for these messages. This will work with a text pager also. When FINDU sees a message to him on APRS it generates an RSS Feed that Yahoo-Alerts is watching. YahooAlerts then forwards the RSS Message as Text to his cell phone. Although this is only one way

communications, it still lets him receive his APRS messages at any time on his cell phone. He can customize the RSS feeds from FindU for weather alerts, or APRS users X amount of miles from him. Since his cell phone already receives email, he can already receive any text-messages to his ARRL callsign address.

APRS MESSAGES AND THE IPHONE:

NV6G, Greg has announced a beta-application for the IPHONE[12] that has implemented full APRS messaging support through OpenAPRS's DCC interface. It also enables ham radio iPhones to be tracked using their GPS through the internet network to OpenAPRS's servers and out to the APRS-IS. Both systems follow OpenAPRS's license verification system. He expects to release the software sometime in late November.

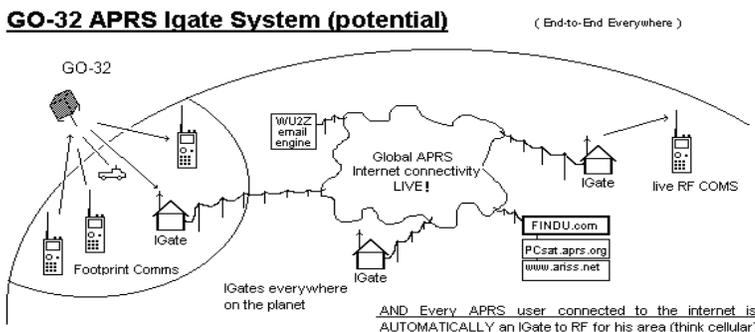


APRS MESSAGING ON WINDOWS-MOBILE 5&6:

Lynn, KJ4ERJ, author of APRSISCE mentions that he has an APRS-IS client (beta)[13] running for Windows Mobile 5 and 6 specifically tested on the AT&T Tilt and maybe the SmartPhone (Motorolo Q). See his mobile KJ4ERJ-12 on FINDU.COM or APRS.FI. This can bring APRS to every ham with these cell phone devices!

MESSAGING VIA SATELLITE:

There are (and have been) many Amateur Satellites that are enabled for text messaging. Since most of these satellites are accessible just about from anywhere on earth a few times a day, they make excellent ways to get a message out of a wilderness area. Existing satellites workable from an FM mobile are PCSAT-1 [14], ARISS[15], and the many older satellites mentioned in ASTARS[16]. In an effort to encourage text messaging via those satellites, we encourage a satellite version of the Simulated Emergency Test called SSET[17]. The objective of SSET is to see how many amateur operators can get an APRS email text-message sent via satellite using only their APRS HT or mobile rig.



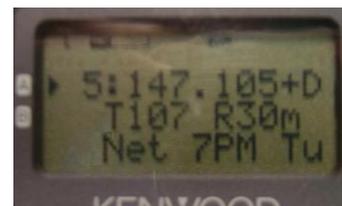
OTHER APRS TACTICAL SITUATIONAL AWARENESS:

Using the above methods lets us send and receive all manner of local and global information to the mobile/portable ham radio operator no matter where he is. In addition to text message, here are some of those additional items built into every APRS radio and display system that may be useful to the traveling operator:

- * Local situational awareness [the global APRS system] (who is nearby)
- * Local/Global Message capability by callsign (this article)
- * Display of locally recommended voice frequency for travelers passing through [18]
- * Ability to check-in and receive messages and email and do basic functions from any DTMF radio using APRStt [2]

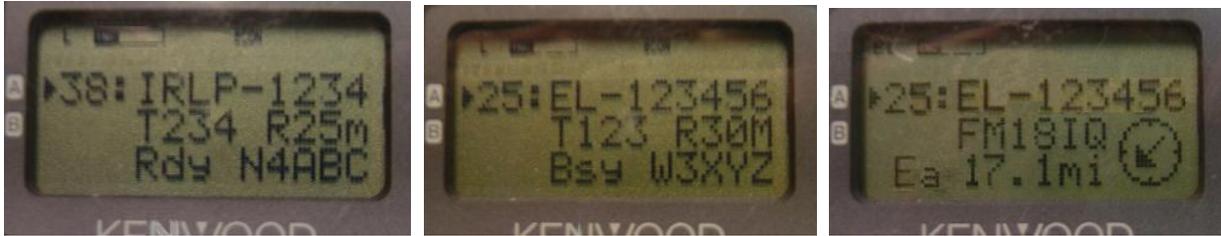
TRAVELERS VOICE REPEATER FREQUENCIES:

One of the most useful bits of text-message available to the amateur radio traveler is the display of the locally recommended travelers voice repeater frequency. This information is being pushed to the front panel of all APRS radios but can also appear on any of these texting devices when the operator enters the footprint of that repeater. Since 2004 we have been encouraging this Local Info Frequency Initiative [18]. It displays the best recommended voice repeater and other RF assets of value to the traveler such as the local IRLP, Echolink, and Winlink frequencies, or NET times or meetings in progress, etc as



shown below on the TH-D7 displays. That pretty well covers everything a visiting or traveling operator needs to make local contact.

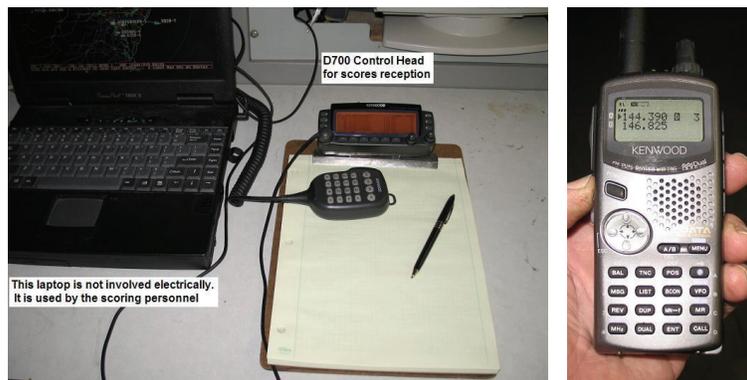
Notice how the IRLP and ECHOLINK nodes identify not only their node numbers and callsigns, but also their Tone, Range and status. (Bsy, Rdy, Lnk etc)... By pressing the OK button to see the POSIT screen, you can see that the Echolink node is 17.1 miles to the Southwest. [these photos were taken before we noticed that the Frequency on the second line was missing!]



APRS is a two-way local Information Distribution and Communication System (not just a vehicle tracking system). Please see the web page that corrects these misconceptions [20].

The objective of APRS has always been Human-to-human local real-time info and communications! (not just vehicle tracking). Universal Text-Messaging among all Ham radio clients is an equal objective. The APRS-Internet-System (APRS-IS) is the global backbone that can tie all other systems together with just the right software.

GPS TRACKERS ARE TWO-WAY-TOO: Even transmit-only APRS trackers should be configured to facilitate two-way human communications. The RECEIVER of any tracker should be tuned to a desired voice communication calling channel and this frequency information should be placed into the beacon text of the tracker. This way, all who see the tracker position packet can also see his frequency and establish contact with the operator. . Often this can simply be the APRS Voice Alert frequency which is automatically included in every APRS radio [21].



TEXT-MESSAGING FOR EVENTDATA: While we are talking about overlooked capabilities,... Not only can these radios, cell phone and laptops convey messages and frequencies, but they also make excellent data entry devices in the field for amateur radio at special events (and not just position and messages!)[22]. As shown in the figure above, a few simple text messaging key strokes on an APRS HT can report numbers, scores, times, ID's and all manner of data at events supported by ham radio. These error-free transmissions are far more efficient than voice reporting in most cases. In the above photos, scout troop scores and info are entered on the keypads of handhelds, and these then appear as messages on the display head of a TM-D700 radio attached to the clipboard. One of the operators at net control can copy this error-free info directly from the display or automatically to custom software for the event.

CONCLUSION: Every teenager in the world now takes text messaging for granted and APRS has had handheld text messaging now for over ten years. Some other ham radios have had DTMF text message for over 15 years. It is time we consider all these systems as just part of a Universal Ham Radio Text Messaging System. With a little work, we should be able to meet the objective of only needing a callsign for universal ham radio instant contact and text-messaging anywhere, anytime using any device.

de WB4APR, Bob

References:

- [0] http://www.kkn.net/~n6tv/Text_vs_Morse_Leno_2005_05_13.wmv Morse Code on Jay Leno show
- [1] Maximizing the Mobile Motorist Mission, QST, September 2008
- [2] www.aprs.org/aprstt.html, the APRS Touchtone System
- [3] www.cssincorp.com/aprstt.html
- [4] www.aprs.org/aprsxo.html
- [5] www.activeham.com/pmwiki.php?n=Main.NewAPRSLinkSPCommand, email via WLNK-1
- [6] www.aprs.org/messages/message-issues.txt, Issues for Internet to APRS messaging.
- [7] www.findu.com/cgi-bin/entermsg.cgi? – Provides a .CGI link for message entry
- [8] www.openaprs.net – provides an on-line message capability via the openaprs.net system
- [9] www.winlink.org/aprslink - provides a winlink APRS packet radio EMAIL capability
- [10] <http://rss.findu.com> – an RSS output capability on FINDU.COM
- [11] <http://alerts.yahoo.com> – An email alert system on YAHOO
- [12] <http://ibcnu.us> The Iphone-APRS application by NV6G, Greg
- [13] <http://groups.yahoo.com/group/aprsisce/join> APRS on the AT&T Tilt phone by KJ4ERJ
- [14] www.ew.usna.edu/~bruninga/pcsat.html - Naval Academy APRS satellite
- [15] www.ew.usna.edu/~bruninga/ariss.html - ARISS on the ISS
- [16] www.ew.usna.edu/~bruninga/astars.html - APRS Satellites
- [17] www.aprs.org/sset.html - Satellite Simulated Emergency Test (Email from your radio)
- [18] www.aprs.org/localinfo.html - displays local repeater info on travelers APRS radios
- [19] www.aprs.org/FT51-TH78l.html - Using the FT-51R and TH-78A for text messaging
- [20] www.aprs.org/APRS-tactical.html - The misconceptions about APRS
- [21] www.aprs.org/VoiceAlert3.html - The APRS Voice Alert back-channel for instant contact
- [22] www.aprs.org/aprsevent.html - Using APRS messaging for data reporting at scout and other events