

Island HF Experimental Digital Net Report:

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Between November 21st to December 19th 2023 IslandHF initiated an experimental Digital Net using JS8, VarAC and Winlink P2P using VARA HF modem on 40m once a week every Tuesday.

The purpose of this experimental net was to explore radio communication between member of Island HF as an alternative to voice net.

Information and platform resources were posted on the IslandHF.ca website:

<https://islandhf.ca/index.php/2726-2/digital-hf-nets/>

Only a few stations participated in one or two of these platforms for a couple times each. VA7PX, VE7JEY, VE7JBL, VE7IRR, KF7CPL and VA7YJJ as the investigating station.

Not enough traffic was generated between ourselves to assert functionality for a net with many participating stations. Contacts were mostly one to one (P2P) and with broadcasting acknowledgement. Regardless of these shortcomings these platforms reveal a real potential for group communication. Some of these features are illustrated in the resource materials provided by the platform providers and are listed in our web page for easy access. However, those references may be too abstract or theoretical to really appreciate the opportunity they offer.

HF Digital Weak Signal:

First, let us review the advent of HF Digital Weak Signal Radio which is at the heart of this Brave New Waves of HF.

HF digital Weak Signal Radio is a force of nature in Amateur Radio. Its initial release appeared in 2008 and it was a novelty.

FT8 came along in 2017 and is currently the one of the most popular digital modes in amateur radio because of its ability to send signal despite challenging propagation conditions, high noise environment, low power operation (QRP) or even compromised antennas. It is excellent for HF Dxing. In other words, you can have a contact almost anywhere in the world with 50 watts power and a simple dipole antenna. FT8 is great for making QSOs all over the world but is limited to 13 text characters for each transmission period. Not great for conversation.

Then came JS8 which uses FT8 protocol and extended its functionality to a chat platform where stations can have a sustained conversation with small messages. That was a great improvement with additional tools like mail messaging and group selection that makes this platform very attractive for different radio applications.

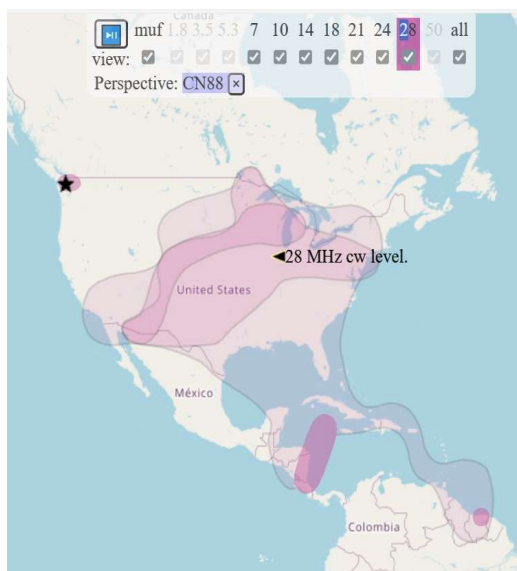
Then came VarAC which uses VARA (virtual) modems released in 2020 to provide an interface between your radio and computer. Functionality is based on FT8 but does not have the limitation of FT8. VarAC is truly an app for group and peer to peer messaging, mail, file transfer, beaconing, digipeating and ping (SNR) test to check bands condition and reliability. Its functionality is well integrated with your computer environment having access to the default setting of your various apps and internet connectivity. It has depth and width for various communication scenarios from QSO, Chats, Nets, Emcomm, Post office (vault), Special events, etc... all on one screen. Signal Reporter (PSK Reporter) is supporting that mode as the major on line logbooks do.

Winlink platform is a mail server for amateur radio that links radio and the internet email services. Standard emails can be sent and received with amateur radio or standard email apps to radio stations or your mail server to any body in the world with an email address. Only amateur radio talk (not commercial) is allowed. Your ID is your registered call sign. It is used for emergency or backup communication by local governments USA/CANADA, local radio groups/clubs and any amateur radio operator who wishes to.

Below is my attempt to summarize some of the features that are unique to each platform that you may find useful to know in expanding your amateur radio practice and expertise.

Signal sensitivity and propagation:

The map below was produced on Dec14, 2023 at 14:33 Pacific Time by HF Propagation Map at <https://hf.dxview.org/perspective/CN88jj> using my approximate home station on Vancouver Island CN88 for the 10m band. It illustrates the communication range and path accessible for the 3 major modes of transmission. The dark shade area is for SSB voice coverage with a SNR greater than 10 necessary, medium shade is for CW coverage with SNR greater than -1, and the light shade area is for digital mode which can decode down to a SNR as low as -28. As you can see, some times there is a difference of many magnitudes that can not be ignored.



“The map is a real-time radio propagation from stations operating on 11 bands between 1.8 and 54MHz in the amateur radio service worldwide activity from the last 15 minutes and is automatically updated about every minute. JavaScript must be enabled to use and see the real-time graphics.

The Data for the map is gathered from several online sources: WSPRnet, Reverse Beacon Network (CW, FT4, FT8), and DX Cluster. Some of these sources provide SNR information.” From the website.

This is why HF Digital Weak Signal is really a force of nature and makes HF communication possible with low power and modest mobile antennas either on your balcony, your car or in the park.

Transmission Speed: Comparing with Morse code equivalent based on 12 wpm = 60 characters/m I did the following mini simple tests to check the difference in speed transmission on 40m around 7.1Mhz.

Test 1: using FT8 as a reference, maximum 13 characters message “BG3OJZ-VA7YJJ”

- 15 seconds for FT8 = 52 wpm
- 20 seconds for JS8 = 39 wpm
- 6 seconds for VarAC = 130 wpm at VARA lowest speed 500Hz, no registration needed

Test 2: using VarAC as a reference, maximum 91 characters broadcast message : “*This is a test for speed transmission in broadcast mode for JS8 and VarAC for 91 characters*”.

- 50 seconds for JS8 = 109 wpm
- 8 seconds for VarAC = 682 wpm at VARA lowest speed 500Hz, no registration needed

Note: Chat text can be longer in VarAC but will be broken down into packet segments for transmission.

Test 3: Comparing HF and VHF Winlink gateway stations using same message (91 Chr) at 7.120 MHz.

- 43 seconds or 127 wpm for Winlink VARAHF modem for complete transmission with an average of 6.5 characters per second, 280 characters were send for that 91 characters message. Propagation was estimated at 96% efficiency to a local gateway station.
- 33 seconds or 165 wpm for Winlink using TNC X on 2 meters 1200 baud with an average of 8.2 characters per second to a local gateway station with instant connectivity. An increase of efficiency of about 25% can be noted in the transmission on VHF. The difference is not significant enough assuming the transmission quality was similar to both tests, VHF might have been better. HF digital using VARA HF modem is truly an effective alternative the packet AX.25 protocol developed in the 1980’s (too many years ago) that is still used in our TNC units that are too expensive to buy in my view. Note that transmission speed varies with band condition so is it relative. In HF, having access to all its bands, we may find better transmission quality to stations further from us which is not the case for VHF/UHF stations.

Conclusions: Whatever is your aspiration in HF amateur radio, HF Digital Weak Signal will shape the future of HF amateur radio and the new comers will feel more comfortable in using a platform and a SDR radio that is more similar in operation and functionality to our smart phones and computers. VarAC using VARA modems is a big game changer. The various transmission speeds with packet data checks and an integrated software with our computer environment is a bid step forward in many applications of radio communication. Speed also means energy saving in transmission, a critical factor for battery operated stations.

Last words: I would like to thanks IslandHF group and the team that supported me in this limited exercise. Also a special thanks to KF7CPL for his active participation. I personally learned a lot about these platforms and I hope this report will intrigue you enough to experiment with them once in awhile.