OVERVIEW OF SOFTWARE FOR DIGITAL HAM RADIO

Where to download free software: (often there are helpful help files also, so you might want to peruse around a bit more than just download)

FLDIGI	https://sourceforge.net/projects/fldigi/files/fldigi/fldigi-3.23.15_setup.exe/download https://sourceforge.net/projects/fldigi/files/fldigi/ Downloading FLDIGI can be a bit tricky. Try going to the above page and then selecting (for Windows) the file ending with "setup.exe".
WINLINK EXPRESS	http://www.winlink.org/sites/default/files/downloads/winlink_express_install_1-4-2-0.zip
UZ7HO SOUNDMODEM.EXE	http://uz7.ho.ua/modem_beta/soundmodem95.zip is the actual download.
WINDOWS BPQ	http://www.cantab.net/users/john.wiseman/Downloads/LastestInstaller/ is the directory http://www.cantab.net/users/john.wiseman/Downloads/LastestInstaller/BPQ32_6.0.13.1_20160927.exe is the actual download link

> **Malware Detection Software:** Many commercial virus checkers and malware detectors will consider very rare software to be automatically suspect, and delete or refuse to run or load it. You will have to find out how to tell your malware detection software to accept these quite-respectable programs. Every malware detection program works differently, so read your instructions!

Digital Ham Radio has many facets. Characters from a computer become some version of "tones" going to a transmitter microphone input; audio from a receiver speaker output gets transformed into characters in a computer and possibly visible on the screen to a user. Software & hardware combine to make this magic happen. This paper will attempt to categorize the major software required to accomplish several communications.

How It Started

The original hardware/software solution was a "TNC" with both hardware and software inside. Kantronics KPC-3 is a common one, the PK232 another. These devices had two modes:
COMMAND mode: allowed users to make "connections" to other radios and other functions
CONVERSE mode: "connected" TNC's entered CONVERSE mode where everything typed went out and was transferred error-free via handshaking between stations. This could be used for "chat" and hence I informally call it "keyboard to keyboard". Control-C would allow users to drop back to COMMAND mode. Enthusiasts built simple email systems called BBS (bulletin board system), did

CHATs together, etc. This sort of died down after cell phones / smartphones eclipsed their applications.

WINLINK

Along came further computerization of the process and automated programs like WINLINK EXPRESS would manipulate the TNC on their own (once directed by a mouse click) to both make a CONNECTION, exchange passwords, negotiate email and attachment transfer, perform transfers in either direction, and automatically disconnect from the station once completed. Such software is fairly single-purposed; you can't typically use it for simple chats. People without cell phone /smartphone access (sea-goers, wilderness explorers, and EMERGENCY COMMS PEOPLE) found this very useful.

KISS

Then a new kind of hardware interface came along named "KISS" (for Keep It Simple....) with much less software in the interface, which made sense because the personal computers were more and more powerful and more able to do more of the software processing. The PC software might be single purposed as well and strictly control the process, keeping the user divorced from the keyboard-to-keyboard CONVERSE mode. WINLINK provided interfaces to this new interface.

SOUNDCARDS

Even further flexibility (and complexity) arrived when simple soundcard-based systems were wrapped with a bit of software (e.g., AGWPE & UZ7HO Soundmodem.exe forWindows, Direwolf for Linux) to emulate a KISS TNC...

VHF VERSUS HF

VHF and HF users further had a different digital experience. HF users can make very long distance contacts easily (at times) and need no repeaters, but have horrible problems with static and interference that dramatically reduce throughput, have only limited bandwidth, and generally find error-corrected CONNECTED modes to be unusable. HF users typically use un-connected "broadcast" modes which don't even form their transmissions into Packets (like AX.25 packets) --- they usually use modes like PSK31 or RTTY which simply take characters and spit them out as tones over the air. Everything is simply "broadcast" and anyone can listen. WINLINK is an exception -- using single-purpose software and specially chosen modes such as WINMOR, connected, packetized, error corrected and automated connections are accomplished routinely to transfer EMAIL (not keyboard-to-keyboard) using a soundcard interface, or PACTOR doing the same thing with much more of the smarts in an expensive specially designed modem.

Useful reference: http://www.soundcardpacket.org/8tncmodes.aspx

HF Experience

	Unconnected Character-based Broadcast	**Connected, message based**
Software	**FLDIGI**, Ham Radio Deluxe	**WINLINK EXPRESS**
Modes	PSK31, CW, Olivia, Throb...JT65 .....endless	WINMOR, PACTOR
Hardware interface	soundcard	Soundcard (winmor) Expensive modem (pactor)

VHF Experience

	Unconnected character based broadcast (UNCONVENTIONAL!! but works)	**Unconnected packet-basedbroadcast -- APRS**	**Unconnected to connected packet-based human-interactive broadcast**	**Automated message transfer over packet**
Software	**FLDIGI**		MixW **Windows BPQ** (can be used for this) Simple terminal emulator works for a real TNC	**WINLINK** (various client software, including WINLINK EXPRESS, PACLINK etc)
Modes	PSK31, CW, Olivia -- same as HF	AX.25 Packet (1200/2200 tones)	AX.25 Packet (1200/2200 tones)	AX.25 Packet (1200/2200 tones)
Hardware interface	soundcard		TNC --with terminal emulator Soundcard -- with MixW or BPQ	Works with real TNCs directly, with KISS TNC's directly, and with Soundcards using **UZ7HO soundmodem** or other wrappoing software.

Review of particulars on the software

SOFTWARE	Interface	Notes	Protocols
FLDIGI (versions available for Windows,, MAC and even Raspberry Linux Raspbian)	**soundcard** - In configuration dialog, you can choose speakers, mic or soundcard	Signalinks provide PTT by detecting audio; PTT can also be provided by COM rs232 port $10TNC emulates Signalink Can be used on HF or VHF, even thru repeaters. Broadcast, not error corrected	CW PSK Olivia RTTY too many to list Can be used on HF or VHF, even thru repeaters. Broadcast, not error corrected.
WINLINK EXPRESS	Multiple -- • direct to soundcard for WINMOR • direct to PACTOR modem • direct to real TNC • direct to KISS TNC • via TCP/IP to soundmodem wrapping a soundcard (typically port 8100) • can also use other wrapping software such as AGWPE, etc.	Automated system, doesn't really allow you to have simple conversations; for sending and receiving emails/attachments. Easily used with Signalink or $10 TNC as long as the signal trips the PTT circuitry properly. Error corrected, ARQ handshaking	WINMOR -- for soundcards PACTOR -- with special pactor modems PACKET -- primarily used for VHF,
BPQ	Very versatile -- can connect to • KISS packet modems (including	Although intended to provide an automated switching system for NODE or RMS gateway stations, this software also provides a free	For our purposes, we'll use it for PACKET over software-wrapped soundcards (including $10TNC) -- but this very versatile software

	soundcards via soundmodem) • • WINMOR over soundcards • • PACTOR • • probably many others	client approach to connecting to other NODES etc.	can do innumerable protocols and is the development environment for the new ARDOP protocol that may replace WINMOR.

Download BPQ for Windows from:
http://www.cantab.net/users/john.wiseman/Downloads/LastestInstaller/