Newcomers and Elmers Net: Digital Fun Part 1   Robert AK3Q 12.14.14

Digital Modes
-- Several programs such as fldigi, DM780, and DxLab give a lot of options for receiving various digital modes.
-- Strictly speaking, you do not have to have your radio connected to a computer to get digital modes to work, but you will get better results.

Computer/Audio Connections
There are several options for this depending on the radio you have and how you use it.
-- Standard portable radios or desktop radios without a computer interface/CAT connection will need to be connected through a "Line Out" connection or through a speaker/headphone connection.
-- Depending on how your radio is designed, usually a line out connection is the best way to go if available, as these typically have a steady output level which can then be manipulated as needed using the computer volume controls.
-- "Line In" typically works best, but if there is not one available, you can use the "Mic" input. It will be more sensitive than the "Line In", but quite usable.

Assuming you have a computer/CAT interface connector on your radio you can get the appropriate data cable to go into either a serial or USB interface on the computer.

The best radio/computer option, but more expensive, would be to have a dedicated audio card for the digital modes, such as a Rigblaster, SignaLink USB, or similar device.
-- The advantage here is that the soundcards are designed to have adequate signal processing capabilities, taking some of the load off the computer's internal soundcard, and they are accessible since these units are external devices.
-- Where things can get a bit tricky is in the audio settings of your computer's operating system.
-- Follow the manufacturer's recommendations closely if using an external soundcard, and if using a computer soundcard with line inputs or mic inputs, get familiar with how to adjust these settings in the advanced menus.
-- Some software/hardware combinations can be difficult to get set just right. Fortunately this is usually a one-time thing unless you change something, but don't be surprised if things take a bit of tweaking.
-- Also almost all of the software and hardware out there have extensive user-bases, and plenty of help is available online.

Digital HF Modes
Digital modes on HF frequencies are varied and plentiful.
-- One of the more exciting features of digital modes is that they do not
need high power to work around the world
-- 30-35 watts is usually all that is required; in fact, much more than this
and your signal gets distorted, causing problems for others
-- While a relatively new field as far as radio goes, there have been a
number of modes developed which are considered old standards, with many
other new modes coming almost daily.
-- This will in no way be an exhaustive listing, but I will cover some of the
more common and/or user-friendly modes to get you started.

WSPR
This is a beacon mode of software which allows the user to monitor WSPR
signals or transmit and monitor signals.
-- when monitoring and connected to the internet, the date will be sent to an
international database/map which can display and track who you hear to
help others see where their signal is going
-- if you also transmit a signal, you can see where your signal is being
heard, a really cool feature!
-- this is very useful for propagation checks and antenna path checks
-- also you can get an idea of where your signal will be likely to be heard
-- since the mode is digital, sometimes this signal can be heard where voice
cannot, but this is all part of the testing and learning process

RTTY
RTTY, or radioteletype, was the primary means of digital communications
from the 1940s until the 1980s, and is still in use today.
-- Many governments, military, and amateur radio operators still use the
mode, and the Coast Guard and other weather services still use it as well.
-- There are regular RTTY contest weekends, and some amateur radios still
come with RTTY decoders built in for listening purposes.

PSK31
Without getting into all of the technical details of PSK31, this is a very robust
mode which has become extremely popular for amateur radio work
-- The bandwidth requirements are quite small, but accuracy is quite good.
-- *PSK* stands for phase-shift keying, referring to the modulation method,
and 31.25 is the bit rate.
-- The software on the receiving end must synchronize with the transmitting
software so that it knows what to expect.
-- All of this is done through the software and is transparent to the user.

One of the reasons for the popularity of PSK31 has been the development of the waterfall (or panoramic) view of signals.
-- Early PSK software was somewhat difficult to tune because the bandwidth of the mode is so narrow.
-- By using a panoramic view of the audio (much like a spectrum analyzer) one need only "point and click" to adjust tuning to receive the signal.

There are numerous variations of PSK31 for specialized uses and higher speeds, but the most widely used is still PSK31.

Like almost all of the digital modes, the greatest strength of using a computer to send signals is the computer's amazing ability to recognize signal patterns far below levels distinguishable by the human ear.
-- What we only hear as static, synchronized software can process signals well into the noise and still get a clean copy.
-- In this way digital modes have surpassed Morse Code for sheer ability to be heard under difficult conditions, but Morse Code is still supreme in terms of allowing the human ear to process the signal without a computer.