

Westmoreland Emergency Amateur Radio Service
RADIO MAIL SYSTEM
ARCHITECTURE AND OPERATION
As of December 23, 2020

The purpose of this document is to describe the WEARS Radio Mail System (RMS), explain its components, and describe how it is intended to be used.

The WEARS RMS is built around the components and capabilities of the Winlink system. The central hub of the WEARS RMS is the RMS Gateway, housed in the Supplemental EOC in Unity Township. The gateway currently operates only as a VHF gateway, using two different modes - packet radio (KISS protocol), and VARA-FM (an adaptation of the VARA HF weak signal protocol). VARA-FM is much faster than packet radio.

The Gateway acts as an interface between the RMS and the internet. It consists of a computer running Windows 10, two radios (one for packet and one for VARA-FM), a Terminal Node Controller (TNC) for packet, and a Signalink USB sound card interface for VARA-FM, and a power supply for the radios and TNC. The gateway operates on 147.80 for packet, and 432.675 for VARA-FM.

The gateway software consists of two parts. The primary program is the Winlink RMS Packet program. This program takes packets that come in through the radio and TNC or VARA software modem, establishes a connection to one of the Central Mail Servers (CMS), and passes the traffic.

A supplemental program that operates in combination with RMS Packet is RMS Relay. This program has several operating modes. Its primary use in our case is to act as a buffer between RMS Packet and the internet link. If the internet link were to go down, RMS Relay stores the messages that would have gone out and then automatically sends them when the link comes back up. This protects our operation against an unstable internet link that might cause connections to be rejected by gateway.

Another benefit RMS Relay provides is that if the internet link goes down for an extended period, it essentially acts as a county-wide mail server, and allows us to continue passing messages among ourselves or anyone else who could connect to our gateway.

The Supplemental EOC has a building-wide generator backup; however, there is usually a short delay before the generator starts up and supplies power. If this were to occur, the computer would lose power for a short time, so we have a UPS (Uninterruptable Power System) that will keep the computer from shutting down during the generator start delay. The gateway computer is also set up to automatically restart all the gateway software in the event the computer reboots for any reason (such as installing Windows updates).

The WEARS RMS also consists of a variable number of client stations. A client station can be set up with a radio, a packet TNC or sound card interface, and a computer. To set up a client station, first go to www.winlink.org. This web site has everything you need in the way of documentation and tutorials, which can be found under the “Book of Knowledge” banner at the top of the screen. It also has links to download the preferred client software – Winlink Express. There is also a Winlink Programs User’s Group available on Google.

To operate a client in the packet radio mode, you need a TNC. The list of hardware TNC’s (as well as the few radios with built-in TNC’s that are supported) can be found in the Winlink Express setup screen as a drop-down menu when you specify which TNC you’re using. Other instructions for configuring Winlink Express are contained in its help screens.

If you’d rather not incur the higher cost of a hardware TNC and/or already have a Signalink or Rigblaster sound card interface, you can use a software TNC called SoundModem. To download this program, go to uz7.ho.ua/packetradio.htm. The download file is called soundmodemXXX, where XXX is the version number. For example, version 1.00 is soundmodem100. Instructions on how to configure it and to configure Winlink Express to use it are in Appendix A at the end of this document. To operate a client in VARA-FM mode, you will need to purchase a license and download the VARA-FM modem. This can be found at www.rosmodem.wordpress.com.

As an organization, WEARS currently operates two clients. One is set up in the CP600 Command Post vehicle (callsign WC3PS), and the other is in the Unity EOC (callsign W3CRC). The CP600 Data Mode Station is capable of sending system email on VHF through the gateway at the Supplemental EOC, or HF through other existing HF gateways. It also has the capability of operating any digital mode supported by FLDigi and used by the PA NBEMS system, such as Olivia or THOR. This station consists of the following:

- a. A laptop running the Winlink Express mail client, as well as the FLDigi suite of programs.
- b. Two Signalink USB sound card interfaces, one for VHF and one for HF.
- c. An Icom IC-2820H dual band radio. VFO b of this radio is used for communication with the RMS Gateway and the Unity EOC, and is configured to

communicate through the one of the SignalLinks. VFO a of this radio is left for voice operation.

d. A Kenwood TS-480 HF radio. This radio is connected to the other SignalLink. Using either VFO, this provides two capabilities.

(1) Sending email over an HF link to an HF gateway anywhere in the country (or out of it, for that matter).

(2) Operating FLDigi using multiple modes to communicate within the PA NBEMS system.

The client at the Unity EOC does not operate with a radio, but links directly to the gateway through the building's LAN.

One of the weaknesses of the Supplemental EOC as a location for the RMS Gateway, is that it is in relatively low ground surrounded by ridges and hills. Because of this, the system employs digital packet repeaters (digipeaters) to extend the system's packet radio coverage for packet operation. VARA-FM has no digipeaters at this time, but may have in the future.

A digipeater operates in a simplex (or half-duplex if you prefer) mode, on the same frequency as the gateway. Any packet it receives that has its callsign in the address block of the incoming packet is automatically retransmitted on the same frequency. Its sole function is to extend the range of packet communications. There are no PL code restrictions.

One digipeater is operational on the county tower at Bear Cave on Chestnut Ridge above Derry. Its callsign is W3CRC-1, and it can also be addressed using its alias – WEARS1. A second digipeater is operational at city hall in Greensburg. Its callsign is KB3NSJ-1, and it can also be addressed using its alias – WEARS2. During incident support operations, if a location in a low area cannot communicate through either of these digipeaters a portable digipeater will be set up in that vicinity. One portable digipeater/client station has been prepared, and has to callsign of WC3PS-2.

The WEARS RMS system also easily interfaces with any Mesh network (or other long range wifi network) that may be operated by WEARS in the future.

In the CP600 Command Post, this is accomplished by having the Digital Mode Station's computer on the command post LAN. The Winlink Express mail client program can be selected to operate in the Telnet mode. In this mode, messages will be sent out over any TCP/IP network to which the computer is connected. Thus, if the Command Post LAN is on the Mesh network, the mail can go out over the Mesh network. By connecting the RMS Gateway computer with the Mesh network instead of the internet, and placing it in the Post Office mode, we could then operate a self-contained county-wide email system over the Mesh network if there was a total internet infrastructure failure. Other mail clients could join this network by operating a Mesh node transceiver connected to

their computer and using the Telnet mode of their Winlink Express client program.

Also, since CP600 has an AT&T FirstNet cellular modem, if that system is operational Winlink Express can send mail that way using the Telnet mode.

The document will be updated periodically as new capabilities are added or current equipment is changed.

APPENDIX A RADIO MAIL SYSTEM MANUAL

CONFIGURATION OF UZ7HO SOUNDMODEM

Once you have downloaded the Soundmodem zip file, just unzip the folder, store the resulting soundmodem.exe file in a convenient folder, create a shortcut and place the shortcut on your desktop. No installation process is required.

On the Soundmodem screen, select "Settings". On the drop down menu, select "Devices".

There are drop-down menus for Input and Output devices. Your Signalink will show up as USB Audio Codec. Select that for both input and output. If you are using a Rigblaster, a similarly named option will be listed.

Check the box for "TX rotation".

Check the box for "Single channel output"

Check the box for "Color waterfall", UNLESS..... Color waterfalls use a lot of resources. If you have an old, slow, or similarly limited computer, do not check this and use the black and white waterfall.

Check "Stop waterfall on minimize".

Uncheck "AGWPE Server Port".

Check "Enabled" for "Kiss Server Port".

PTT Port should be "NONE". Make sure neither box is checked.

Click OK.

Now select "Modems" from the settings menu.

Check "Default settings".

Check "KISS Optimization".

Check "non-AX25 filter".

Ignore modem B, we do everything on modem A.

Set mode to "AFSK AX25 1200 bd"

Click OK.

Within Winlink Express, to configure the packet mode to use UZ7HO Soundmodem, do the following.

Select "Packet Winlink" from the mode drop-down menu.

Click "Open Session" to open the packet mode window.

In the packet mode window click "Setup".

Set Packet TNC Type to "KISS".

Set Packet TNC Model to "ACKMODE".

Set Serial Port to "TCP".

Under the TNC parameters, select 1200 Baud.

Check "Enable IPoll" at the bottom of the screen.

Click "Update" to save the settings.

The normal sequence of operation is to start Soundmodem first, then Winlink Express; however, this is not critical. You can start them in any order as long as they're both running. Also, don't forget to turn your Signalink or Rigblaster on.

A note about using sound card interfaces on Windows 10: Even though they plug into a USB Port, sound card interfaces are not assigned a COM Port by Windows as they are not considered an Input/Output device, but are considered a sound card like the internal computer soundcard. When the sound card interface is first plugged in, for some unknown (and really dumb) reason, Windows makes the new sound card the "Default Device". The problem with this is that all the Windows system beeps, burps, and chimes go to the Default Device; so if that's your Signalink, each Windows beep will key your radio. You need to make sure the internal computer soundcard is set as the default device.