Westmoreland Emergency Amateur Radio Service
**RADIO MAIL SYSTEM
ARCHITECTURE AND OPERATION
As of September 3, 2018**

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 2000 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 packet radio (KISS protocol) technology. Plans include adding an HF capability sometime in the future.

The Gateway primarily acts as an interface between the RMS and the internet. It consists of a VHF radio, a Terminal Node Controller (TNC), a power supply for the radio and TNC, and a desktop computer running Windows (currently the only operating system under which an RMS gateway can operate). The gateway operates with the callsign N5BLP-10 and the entire system operates on frequency 147.480.

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, 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 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 gateway computer is set up to automatically reboot and restart both RMS Packet and RMS Relay in the event of a power interruption.  The Supplemental EOC has 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.  Once power is restored (either normal or generator), the automatic reboot configuration would cause RMS Packet and RMS Gateway to automatically restart, and gateway operation would be restored.

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, and a computer.  To set up a client station, first go to www.winlink.org and establish an account.  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.

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 one you're using.  If you'd rather not incur the cost of a hardware TNC and already have a USB SignaLink sound card interface, you can use a recently developed software TNC called SoundModem.  To read about this program and get instructions on how to install and configure it, go to www.w2ygsoftware.com.

As an organization, WEARS currently only operates one client, set up in the CP600 Command Post vehicle.  The CP600 Digital 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, such as Olivia or PSK31.  This station consists of the following:

     a.  A Dell D830 laptop running the RMS Express mail client, as well as the FLDigi suite of programs.

     b.  A Kantronics KPC-3+ Packet TNC, for communicating with the gateway.

     c.  An Icom IC-2820H dual band radio.  VFO b of this radio is tuned to 145.09, and is configured to communicate through the TNC.  VFO a of this radio is left for voice operation.

     d.  An Icom IC-706MkIIG all band radio.  This radio is connected to a SignaLink USB Sound Card Interface, which is in turn connected to the laptop.  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 Olivia 8/500 to communicate within the PaNBEMS system.

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 a digital packet repeater (digipeater) to extend the system's coverage.

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 it's 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.

The digipeater is operational on the WEARS tower on Chestnut Ridge above Derry. It's callsign is W3CRC-1, and it can also be addressed using it's alias – WEARS1. The digipeater provides coverage county-wide to points on high ground with line-of-sight. To reach clients in low areas, a portable digipeater will be set up in that vicinity.

A preferred option currently being considered is to locate the gateway itself at the Charter Oak tower, thus eliminating the need for an additional digipeater and possibly eliminating the need for any digipeater at all. This option is dependent on getting internet connectivity at the Charter Oak tower location. Although digipeaters extended the range of the RMS system, they have a downside. Since they receive and retransmit all the packets of a message routed through it, they essentially double the number of packets being processed. This can slow the system down and cause congestion in a high traffic situation. Thus being able to get county-wide coverage without one is a better option.

The WEARS RMS system also easily interfaces with any Mesh network (or other long range wifi network) operated by WEARS. 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 operated 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.