PACKET RADIO, BBSes, AND WINLINK AS FOUND ON A TYPICAL VHF DATA NETWORK:

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INTRODUCTION:

In this document, we will explain the differences between the various terms, modes, and systems that are being used on the VHF packet data networks (and sometimes on HF as well) in Ohio. First, we need to explain the various terms being used regarding these networks, then we will point out the features and differences between the various modes and services, and, finally, we will provide a more detailed discussion of the various systems in use and how to implement and utilize them properly.

TERMINOLOGY:

Below, you will find a listing of the various terms commonly used to describe the various aspects of the packet data network:

Packet Radio – Refers to the transmission mode used by all the services we encounter on the VHF packet data network. Packet radio has certain specifications with which it operates, technically known as AX.25, an adaptation of packet data transmission for Amateur Radio that came from its commercial predecessor, X.25 (see https://en.wikipedia.org/wiki/AX.25). Packet is the transport mechanism that all the services we will be discussing utilize to actually move their data (including Winlink on VHF). Think of it as another mode such as SSB, CW, AM, RTTY, PSK, and the like, but with packet being digital, like the latter two.

Packet BBS – A system, usually running on a PC, but may work on a Raspberry Pi, that allows for posting of messages, both private and public, similar to the dial-up telephone BBSes back in the 1980s, if you're familiar with them (in vogue prior to the WWW Internet of today). BBS is an acronym for "Bulletin Board System," alluding to the posting of paper-based messages on cork type bulletin boards in the "old days" prior to our electronic versions. Packet BBSes are distinctly different from Winlink in operation and features, the only similarity being the use of the packet data mode as a transmission mode for connectivity between systems. Devices such as Kantronics KPC-3 and KPC-3+ models have internal, firmware-based BBSes, but they have limited storage and forwarding capabilities as compared to "full-service" BBSes such as the BPQ BBS.

Packet, when referring to "Packet BBSes," is the system that receives, holds, and transmits messages to/from those BBS systems. They are just a different means, as distinguished from Winlink, of holding and disseminating messages, but without utilizing the Internet. That is a distinct advantage of Packet BBSes – they require no Internet connectivity to operate. They are connected via RF (radio) packet links to users and each other and will function even in the event that the Internet has failed, either locally,

regionally, or worldwide. Packet BBSes can provide the connectivity needed by EM-COM and ARES personnel, ALWAYS, provided there is power to run the systems (and that is often supplied by primary [utility], battery, generator, and/or solar backup systems).

Winlink – A hybrid system that provides for a radio-based email system that also utilizes the Internet to transport and store email style messages over longer distances via Internet pathways, storing those messages on "cloud-based" (Internet) servers. Typically, Winlink connectivity on the VHF packet bands is done via an "RMS Gateway" ("RMS = Radio Message Server) or Winlink end point utilizing RF (radio) in the packet mode to transport the message's data (RF being known as "last mile" connectivity in today's Internet connected world, although it is most likely "many" last mile(s) for Winlink). A more detailed discussion on Winlink will occur later in this document. A Winlink system may be contained within a system running the BPQ connectivity suite of software or via a specialized piece of software provide by Winlink.org and running on a PC along with attached modem(s) and radio(s).

BPQ (or G8BPQ) System – A 100% software-based system (other than a possible hardware –based TNC acting as an modem interface to a radio) that can provide many of the desired capabilities of a modern packet-based system, including a BBS, Winlink RMS Gateway, Node (also sometimes referred to as a "switch"), digipeater, APRS digipeater and gateway, telnet server (connectivity over IP), Winlink Pactor, ARDOP & VARA HF capabilities, automatic RF routing via the node/switch system, and local terminal and BBS access for the system operator (SYSOP). This will be discussed in detail later. BPQ and BBS are completely different terms, so don't get them confused!

TNC – Acronym for "Terminal Node Controller." A TNC essentially acts as a modem (or interface) between your VHF radio and PC, although it can act as a standalone system to collect messages in a simple Personal BBS mailbox system if desired. Typically, those more complex capabilities are bypassed and the TNC is operated strictly as a hardware modem (in KISS mode) in many systems such as BPQ or Winlink Express. The best known version of a TNC today is the Kantronics KPC-3+ unit, preceded years ago by the KPC-3, which had slightly fewer capabilities. Other TNCs were made in years past and are still available on the used market today, such as those from MFJ, Pac-Com, etc. Software-based modems are becoming more popular due to their low (or no) cost while providing good reliability. A software-based modem still requires a hardware interface between the radio and PC running the modem software. The interface sends the packet data audio tones to the sound card interface on your PC. A TNC acts as a conversion device, decoding the packet audio tones into a data stream that your computer can understand.

UZ7HO Soundmodem – A software-based TNC (Terminal Node Controller) that acts as a packet modem to send and receive packet data over the air (typically utilizing VHF transceivers). The UZ7HO software package, available at http://uz7.ho.ua/packetradio.htm, requires some type of a hardware audio interface between the radio and PC, either a home-built device or by utilizing a SignaLink interface, popular for data modes interfacing to RF. Another software-based modem is the Direwolf system that can run on either Windows or Linux systems (an advantage for non-Windows users). Direwolf may be found at https://github.com/wb2osz/direwolf/releases (click on the "Assets" item to expand the list of files).

EasyTerm – A program, designed to accompany the UZ7HO Soundmodem program, providing for a terminal-like interface to connect to and send/receive packet data either to/from a packet BBS or to another stand-alone station in keyboard-to-keyboard chat style activity. EasyTerm is part of the UZ7HO Soundmodem package mentioned above. It is included in the UZ7HO download (see the link, above). EasyTerm is considered to be a "terminal program" much like PuTTY, HyperTerm, and the like.

Packet Terminal Mode (Chat) – In the early days of packet radio, operators connected directly (or via digipeaters) to one another to engage in keyboard-to-keyboard conversations without the use of BBSes. This resulted in real-time conversations such as might be found in the past on RTTY (radio teletype) or, more recently, on PSK modes. Such real-time packet operation is fairly uncommon nowadays, but there is no reason why it can't be implemented if a couple of operators desire to engage in a one-to-one conversation. Packet, in connected mode, cannot handle more than two connected stations simultaneously (no roundtable style chat). However, when using the unconnected, or UI mode, many stations can communicate simultaneously, but many features are lost in UI mode, mainly data integrity which assures the transfer of data without errors. (As an aside, APRS utilizes UI mode.)

Packet terminal mode also provides a means to connect to a Packet BBS using a simple terminal program and a TNC (hardware or software based) that allows a user to list, read, and delete messages by accessing the basic interface of the BBS.

Outpost – A software system that allows for sending and receiving packet-based mail in a fashion similar to a computer-based email program like Microsoft's Outlook email client or any number of other software-based or even web-based email clients for a PC. The packet emails are stored in inbox/outbox style folders with the Outpost system acting as a means to store messages for later retrieval at the operator's convenience. NOTE: Outpost is a separate email client (email inbox/outbox system) that eliminates the need to connect directly and regularly to a packet BBS. It has NO BBS function within its system – it is only a packet email client and MUST connect to a packet BBS to which it either sends or receives packet email to or from a connected BBS. Connecting directly to a packet BBS using a terminal program like the old Windows HyperTerm along with a Kantronics TNC, or EasyTerm via the UZ7HO Soundmodem, requires the operator to connect to that BBS from within the terminal program, list the mail on the BBS, and, finally, read the mail or multiple mail items, all while connected to the BBS – all a labor intensive and time consuming process. The Outpost program simplifies this operation by automating it. It periodically connects to a local BBS, lists the available mail, finds out what mail is new (that hasn't been seen or retrieved previously), then downloads those new items and places them in the Outpost inbox. It also sends any outbound messages to the BBS that were composed earlier by the operator and held in the system's outbox for posting locally on that BBS or for forwarding to distant BBS systems. Outpost can also receive Winlink messages, but CANNOT fully receive Winlink messages that have attachments or templates (this is a limitation of the Outpost system).

Digipeater (or "Digi") – A feature on a smart TNC (like a Kantronics unit) or a packet system, like BPQ, that allows a user to utilize an intermediary packet system as a "digital repeater" or digipeater. In reality, a digipeater is a "store and forward" device, receiving packets, holding them in temporary memory, and then retransmitting that data along to the receiving station, all on the same frequency.

This permits users to traverse longer distances than would be possible over normal "line of sight" paths afforded by VHF radio. See the next term, node, for a more efficient means of repeating packet data over long distances.

Node (or Switch) – Another feature on modern packet systems that also utilizes the "store and forward" technique to span longer distances on VHF. The difference with a node is that the sending station actually connects to the node (connected mode) whereas utilizing a digi is done in unconnected mode (UI). The user connects to the node and is then presented with a command line interface with which he may connect to a system down the line. It's similar to sitting in front of the node's keyboard and monitor in order to control it to further your transmission capabilities. See the section on using nodes for more detail as to why the use of nodes is more reliable and efficient.

Access Methods – Since we have discussed multiple ways to access BBSes or Winlink RMS Gateways, let's quickly list the ways we can access these systems: 1) Using a terminal program, such as PuTTY, HyperTerm, or EasyTerm will work when accessing a BBS, but extra effort will be involved in navigating the BBS message lists and/or manipulating the messages themselves; 2) The use of a highly automated client program such as Outpost to send and receive BBS messages (and limited Winlink messages access along with limited attachment and template capabilities for those Winlink messages); 3) The only useful method for fully accessing Winlink RMS Gateways and their messages directly is through the use of Winlink Express; and 4) Using the BPQ BBS (Mail Server) will allow sending of Winlink messages (outbound), but receiving messages will require that you provide your Winlink password to the BBS (to be stored for future use) along with possible SYSOP intervention to assure proper operation in receiving Winlink messages (receipt of Winlink attachments or templates will be very limited, too).

Fldigi - This is not considered here since it does not involve or support the packet (AX.25) protocol. Fldigi is indeed a suite of data modes with a wide variety of data modems available. However, as of this writing, Fldigi has neither an AX.25 packet modem available, nor the capability to implement any means of connecting to any packet system, BBS, or Winlink RMS Gateway. Fldigi is useful for point-to-point digital communication and is not necessarily automated, although it can be run in a continuous receive mode and record messages over long periods that are sent on the frequency to which it is tuned. Fldigi is good for sending one & receiving many messages via most of its modem transmission types. Fldigi can co-exist on voice channels, such as VHF FM or 60M HF where stations require voice interaction or queries/answers. Fldigi has excellent reliability over marginal paths depending on the modem type and speed. You can find out more about fldigi at http://www.w1hkj.com.

SYSTEMS FEATURES AND DIFFERENCES:

Winlink – Winlink was designed to be an RF (radio) based personal email system, with an emphasis on "personal" since Winlink cannot handle bulletins (mass emails to unknown addressees). Winlink can only deliver email messages to specific addressees, and those MUST have established Winlink accounts or Internet email addresses. Winlink does have a nice capability: It is interoperable between the Internet based email system and Amateur Radio. This means that anyone with an Internet email

account (such as myname@gmail.com) can send an email to a Winlink addressee, and a Winlink user can send an email message to any Internet email addressee. The limitation is that the Winlink user must make sure that the emails they are sending OR receiving MUST NOT contain any commercial information (this a legal limitation, and there is no mechanism to prevent commercial data from being transmitted within a Winlink message – YOU as the sender of such messages, as well as the Winlink system's SYSOP are responsible for making sure that they are following the law and Part 97 rules!). So, you realistically can't have all of your Internet email forwarded to your Winlink account because it most certainly will have various advertisements contained within many of those emails. Some BBSes do have ARRL bulletins forwarded to them (which are devoid of commercialization), but NOT any other ARRL emails such as the ARRL Letter which has many embedded ads within it.

Also, Winlink has another feature that is seen by some as a violation of FCC Part 97 rules: All Winlink messages are sent in compressed format, and the compression is not easily decoded by the casual viewer of the packet data stream coming from or going to the Winlink client/server. This is looked at as being a form of encryption, but it is not. It's just a means of transferring data more efficiently with less data overhead. It is not encrypted, but rather unreadable to the casual packet monitor. Winlink gets around this by making ALL of their messages readable by the public on their website, so essentially all Winlink messages are in the public domain (so, don't be sending things that you don't want someone else to see – pretty much the same situation you have with ALL of Amateur Radio transmissions).

The biggest advantage of Winlink is also one of its greatest disadvantages: Internet! Although Winlink utilizes the Internet to move messages very quickly from one RMS gateway to another (even, perhaps, halfway around the world), if the Internet fails for any reason, along any portion of the Winlink CMS Server connectivity path, Winlink will be unusable (CMS = "Common Message Server" – the main storage hub for Winlink messages). Winlink does have the ability to store messages locally on the local RMS Gateway systems, but you must sign up, within your Winlink Express software, to select no more than 3 systems which will act as Message Pickup Stations (MPS) to which you will connect if an Internet outage prevents Winlink from getting messages to you via the normal path from its CMS Servers. That works well, but the limitations are that you MUST sign up for the 3 MPS stations BEFORE the Internet failure occurs or it won't work. The other limitation is that all those stations trying to connect to the MPS stations they have chosen will most certainly cause a logjam of connecting stations, and also cause a tremendous slowdown of the local RMS Gateway systems as they try to serve their connecting stations and get their mail to them. It will be even worse on any established HF ports since those ports typically may have much slower data transfer rates than VHF ports. Users can connect to their local RMS Gateway stations in peer-to-peer mode, provided the Winlink SYSOP and the user setup their systems in peer-to-peer mode to accommodate the outage. That does not allow for automation of passing messages, however, so everything would revert to a manual transfer of messages. Winlink without the Internet would be very problematic! There is a backup system, however. Read on. . . . . .

Packet BBS – All packet BBSes will permit messages to be posted to specific individual call signs, even those not associated with the BBS SYSOP's call sign (provided the BBS is not setup as a private mail drop, which is typical of the older PK-232 TNCs). Most Packet BBSes will accept mass bulletins with ease! These would typically be addressed to "ALL" and sent as bulletin type messages (using "SB ALL" when

composing the message). Any user can read any bulletin addressed to anyone or any call (bulletins essentially become publically accessible messages – this is NOT possible with Winlink!). The ability to send mass bulletins to many recipients via a widespread network makes these BBSes a great means of distributing information that is of importance to many simultaneous users, such as might be encountered in EM-COM and ARES organizations!

Since Packet BBSes have no Internet utilization, they have a complete reliability against commercial Internet connectivity failures. Some systems may have local IP links to provide improved connectivity to users via a higher profile node, where the BBS is actually located at the BBS SYSOP's QTH which is at a lower profile location, but where it is easier to monitor and maintain its day-to-day operation. Typically, the BBS SYSOP would create an alternate RF connection that acts as a failover path should the Internet IP connection disappear.

Let's discuss message forwarding from a BBS. Any user should be able to send a packet message to any other BBS within the Ohio packet network. For now, we need to keep such forwarding simple, like CALLSIGN@BBSCALL. Should a message appear to get "stuck" on the BBS, with no known forwarding path available, it is the responsibility of the BBS SYSOP to move any message that requires forwarding. The BPQ BBS system can actually notify the SYSOP, automatically, should it have no forwarding path for a posted message to follow. Once such paths are established through intervention and updating of the forwarding tables, overall system forwarding will improve. In addition, all users should make sure they have a "home BBS." The BPQ systems have a "HOMEBBS" command that will allow you to establish the home BBS for your call sign. Just type "HOMEBBS bbscall", where "bbscall" is the call sign of the BBS you desire to be your home system (all without the quotes, of course, and WITHOUT the use of any SSID after the BBS call sign – JUST THE BBS CALL SIGN!). There is also a long format for forwarding with addresses such as N8GD@N8GD.#EOH.OH.USA.NOAM which is useful if we are trying to forward messages well beyond our local geographical area. Unfortunately we don't have a well developed packet network or its accompanying long distance forwarding capability to do forwarding much outside the state of Ohio at this point (perhaps to the West Virginia DAREN system, but that's a stretch for now). Matt, KB8UVN, does have this capability, I believe (over HF), but for the time being, moving messages over long distance is best done via Winlink. We will need to develop long distance capabilities (via HF?) for long-term viability during widespread loss of Internet connectivity.

<u>BPQ System Capabilities</u> – The BPQ system was written and is maintained as freely and publicly available software by a Ham in Great Britain, John Wiseman, G8BPQ. The software has many capabilities which are detailed below:

> <u>Packet Node (or Switch):</u> The packet node (also sometimes referred to as a "switch") is the basis for the entire BPQ suite of software. It is capable of running on a Windows based PC, but can also run on a Linux system, and since it works with Linux, it can also be run on a Raspberry Pi. Typically, a system will run on a PC that has minimal capabilities (low processor power, limited memory, etc.). It runs the basic node/switch module, the BBS, and a user terminal. There are other available types of node software, many built-in to the firmware of a packet TNC. Fortunately, they all work similarly, but node systems such as BPQ's and compatible systems

work well together to provide additional information and connectivity automation (like automatic routing of data without having to know a specific path to an end-point system).

Packet Mail BBS: The BPQ system can be configured to present a fully functional Packet BBS, complete with complex and long distance forwarding capabilities. It has a lot of hidden (to the user) features that make the BBS quite powerful and versatile. Listing all of the various functions and commands via the "H(elp)" command when logged in to the system will reveal the myriad of capabilities available to the end user.

Winlink VHF Capabilities – Stand Alone and Within the BPQ BBS: Typically, the BPQ system makes a version of the RMS Gateway (Winlink access) available via a separate port that usually has the BPQ system's call sign ending with an SSID of "-10" (the N8GD implementation of Winlink access on the Winlink port would be via "N8GD-10"). The BPQ system's BBS is fairly simple in of itself, but it also has the capability to accept Winlink messages as well as move those messages to the Winlink CMS Server on the Internet. It can also receive messages for a registered (on the BBS) user who has provided their necessary Winlink credentials. Some SYSOPs have this system in place while others provide Winlink access via a separate Winlink "RMS Gateway" port, having a "-10" SSID as detailed above. Both methods are implemented simultaneously on some systems while Winlink only access via a port utilizing the "-10" SSID is found on other systems. This is strictly up to the SYSOP and how he has configured the system.

Winlink HF Capabilities: BPQ can utilize an HF radio connected to a port (via a TNC or other interface) and allow control of the radio via software to change modes and frequency. Modems for HF can include Pactor, ARDOP, and VARA (the latter two being software based). The Winmor mode has been eliminated since the Winlink team has embraced the use of HF VARA in its place (VARA, a software-based modem, being much more efficient and faster, all without the need for a very expensive Pactor data modem). All of the HF features of Winlink are supported by the BPQ system. Along with the HF connectivity of the BPQ system comes RF-based failover capabilities to allow the Winlink system to continue to function during Internet outages and serve MPS-based users with their available messages.

APRS: BPQ has an APRS module (Automatic Packet Reporting System), complete with interfacing for the SYSOP to monitor the APRS data as well as APRS mapping. It also has capabilities to send APRS position and messaging data to APRS servers, providing for TCP-based reporting of users' data so that it will show up on Internet based maps such as those found on the https://aprs.fi website. This is all available to support APRS users and the APRS community that may have developed around a given packet system.

IP based access: BPQ can provide a telnet (IP based) port which can allow credentialed users to access the BPQ system over the Internet either for access to available data or messages, or for live configuration or troubleshooting of the operating BPQ system.

USING THE VARIOUS SYSTEMS:

Now that we have presented the various terms and information regarding what we might find on the VHF packet radio network, let's discuss how we can actually put all this great technology to use:

NOTE: These are basic instructions (more like an overview) to get you started with Winlink radio mail or Packet BBS mail. Please refer to the specific software's documentation for a discussion of more advanced operation of a specific system.

How do I use Winlink? – Winlink can be accessed in two ways:

The most common method of access is via the "Winlink Express" program, downloadable from the https://downloads.winlink.org/User%20Programs website. Click on and download the last item in the list on that web page, starting with: "Winlink_Express_install. . . . . ." To sign up for Winlink Express, you DO NOT create an account on the Winlink.org website. You create your credentials (your call sign and password) the first time you log in from Winlink Express (make sure you copy down your login information, especially your password, since you'll need it to login on the Winlink.org website later on). After you have your login information embedded in the necessary locations of the Winlink Express software, you should be able to automatically connect to the Winlink system each and every time you start your Winlink Express program.

In the following paragraphs, each underlined introductory phrase introduces a feature of Winlink and how it is implemented:

> Winlink uses specific mail addresses: Winlink is used when the sender desires to send or receive a message to or from someone who has Winlink-only capabilities and does not have or cannot participate in the currently developing packet BBS network in Ohio. This would include the inability to connect to a packet BBS and/or node that has BBS access. (It should be noted that if you have the necessary hardware, including a radio, TNC/modem [hardware or software based], and a computer, you should be able to access any packet BBS or node outside of the Winlink system with a minimum of some type of terminal software running on your PC.) Winlink can also send and receive messages using Internet email addresses – see the section after the next section.
>
> Winlink was not meant to handle bulletins: Again, we need to mention that Winlink is useful only for sending and receiving messages to/from specific addressees (users). Bulletins are general type messages that can be read by any and all users. You can address a Winlink radio email to multiple users, but you cannot post any type of a bulletin, readable by anyone and everyone on Winlink. A bulletin would be a message that is posted to a nonspecific addressee (not a call sign), such as ALL. Winlink can only handle messages addressed to specific call signs, and only those individuals can read those messages.
>
> Internet email addresses: As mentioned earlier, Winlink can bridge the divide between the world of radio-based messages and Internet email messages. You can send a message to

anyone with an Internet email address. The rules to do so are simple. If you post an email message to an Internet based email address in Winlink Express, you must do one of two things. First, you can address your message to that Internet email address followed by inserting "//WL2K" (without the quotes) in the beginning of the subject line of your Winlink email (you can add any other subject information AFTER the above notation). This notation tells your Winlink Express program that the message is going to end up in the world of Internet email. There is an alternative to the above. If you log in to your https://winlink.org account on the Internet (using your call sign and password that you created when you first used Winlink Express) you will find a list of various links on the left side of your account web page. Click on "My Whitelist." The Whitelist is a list of Internet email address that Winlink will automatically accept without having to add the "//WL2K" notation to the subject line. This works when you have Internet email addresses that you frequently use, whereas the use of the "//WL2K" notation in the subject line works for Internet email addresses that you have never recorded in your Whitelist or you use infrequently. New Internet email addresses can be added to the list.

Attachments: Winlink can accept attachments, such as spreadsheets, word processing documents, PDF documents, etc. There is a means by which such files may be attached to a Winlink radio email within the Winlink Express mail transmission module. You should be careful with the size of such attachments. Most Winlink Express programs limit the total message size to 120 KB or less, so be aware of the attachment size when dealing with message size limits.

Templates: Winlink can also create specific forms within a message such as ICS, Red Cross, or radiogram formats. These can all be selected and specific data created within them when creating your message. Again, message size limits will apply to the addition of any templates.

Method of transmission: Winlink Express requires you to select the mode (or modem) by which you will transmit or receive your messages. You can select from Telnet (which is direct Internet connectivity with NO radio access utilized), packet, or various more exotic (faster and/or more reliable) modes such as Pactor, ARDOP, VARA, etc. (generally used on HF). You must also select which kind of message type you will utilize for your Winlink session. There are two broad categories of message types: Winlink or P2P (Peer-to-Peer). The message types differ by how they are handled by each end of the Winlink system. Winlink types are handled by RMS Gateways (your local system that you, and to which anyone else can connect), or Peer-to-Peer types, which is essentially a simplex version of Winlink where two stations connect to each other to pass messages and where there is no RMS Gateway involved or any Internet utilized during the connection. The messages in P2P are transmitted to and from each system and retained on those systems (not sent to the Internet via the CMS Servers). Remember: You DO NOT need to have a radio/RF connection to a Winlink RMS Gateway to use Winlink. You can send and receive Winlink mail via a Telnet connection (as mentioned in the second sentence of this section, above), BUT you MUST have Internet connectivity for Telnet to work. If you don't have Internet available, you can send and receive Winlink radio emails over an RF (radio) connection – all without depending on Internet connectivity. Many casual mariners or long-distance boaters on

the high seas utilize Winlink to keep in touch with family and friends over HF radio without the expense and complexity of utilizing satellite phones such as on the Iridium network.

Winlink Express operational quirks: Using Winlink Express involves learning the program and its quirks. When it starts, it will remind you that you need to register. Winlink would like for you to donate $25.00 to defray their many expenses, but it's not necessary. The donation WILL, however, get you a registration number that will eliminate the startup nag message reminding you about registering. You may also see, from time to time, a nag message reminding you to upgrade to the latest version of Winlink Express. You should do so to keep the software up-to-date. You will also want to page through the various drop-down menus and make changes, as necessary to the software and various settings. Winlink Express is always presented in the format of two different windows. The main window, which appears when first starting the program, allows for reading any incoming messages that have been received by any of the various means and also allows for creation of new messages to be sent and posting of those messages to the outbox. The secondary window appears once you select the session type (from the top drop-down menu) then open that session. A session is where the transmission and reception of the radio emails occurs. It has a display area that shows the progress of the data movement. The display area also shows you information regarding any errors that may have occurred during a session. Some of this information may be invaluable in troubleshooting transmission and reception problems with your radio and data modem.

Another means to access the Winlink radio email system is by using the BPQ Mail Server. If you connect to a BPQ BBS, you can **send** Winlink radio email messages by using some specialized notation when posting those messages. This is described as follows:

Sending a Winlink message when logged in to a BPQ BBS: First, you need to know the address of the person to whom you will send the message. This can be a Winlink address, such as call@winlink.org or an Internet email address. Either way, you must preface the address with the notation "RMS:" (without the quotes). You would thus send a message on the BBS as:

SP RMS:w1abc@winlink.org

(See the discussion on using the BBS below for specific instructions to send messages.)

A Winlink message to an Internet email address would look like the following:

SP RMS:johndoe@gmail.com

In either case you would type in a subject when the prompt is presented, then add the text of the message, followed by "/EX" (without the quotes) or a CTRL-Z to send the message (standard practice on the BBS).

You will not be able to add an attachment or create a template, but you might be able to create some text based information elsewhere as an attachment and copy and paste it into the body of the message on the BBS. Spreadsheet files in CSV format are easily manipulated as text that can

be copied into the body of any message on the BBS. Creating forms in Flmsg (from the Fldigi suite of programs) is also possible, and many of the formats created in Flmsg are in text formats that can be easily copied into the body of the message on the BBS.

Dealing with non-text based (binary) attachments or templates is best done with the Winlink Express client software.

Packet Radio as it pertains to BBSes – In addition to its use as a transport mode for Winlink Radio Mail, packet radio is used to access the BBS systems and their mail handling capabilities that we have discussed above. So, how do we connect to BBSes, and what programs and equipment do we utilize to get a working system on the air as an end user?

Packet is used to send and receive simple messages (terminal chat mode) or access a BBS using a simple terminal program (EasyTerm on the UZ7HO software modem) or a another terminal program like the old Windows XP based HyperTerm (which can be installed and used on Windows 10), or PuTTY, an open source terminal emulator for Windows. Packet is also used as the modem/transport method by the Outpost PMM program for Windows, giving the user a Windows style email program interface for capturing mail from BBSes as well as sending to such BBSes, all in an automated, completely hands-free system. None of the above systems are able to send attachments or templates for complex messages unless the attachments or templates are able to be reduced to simple text information that can be embedded into a message.

If your needs are simple, using a terminal program (as mentioned above) with a TNC, including the EasyTerm program that works with the UZ7HO Soundmodem program, will allow you to connect to a Packet BBS as well as any of the node/switch functions available on a typical BPQ system. A terminal program can give you the capability to connect to and manipulate a BBS, including listing commands (for reference in using the BBS), listing the available messages, reading messages, deleting YOUR messages, and, importantly, creating and sending messages to other users, either locally or those who frequent distant systems. Your messages have the ability to be forwarded via the VHF Packet Network to those distant BBSes for easy local access by local users on those distant systems. Access to a BBS via these terminal programs will satisfy the needs of many casual users, especially those who only which to connect to a BBS infrequently, say once or twice a week or even more infrequently.

Posting packet messages on a Packet BBS is easy. Looking at the contents produced from the "H[elp]" command when logged in to the BBS reveals that the BBS requires the following to send a message:

S - Send Message - S or SP Send Personal, SB Send Bull, ST Send NTS,
SR Num - Send Reply, SC Num - Send Copy
Winlink: S RMS:call@WINLINK.ORG (sends via RMS)

As was discussed on the previous page, sending messages via Winlink is possible using the syntax on the last line above and explained in detail previously. All BPQ systems that have Winlink connectivity have the ability to send Winlink-bound messages using the syntax discussed on the previous page (using the "RMS:" notation preceding the delivery address).

(Remember, the best source of information to find out what BBS commands are available to the user is by type the letter "H" without the quotes – "H[elp]". All commands are entered at the command prompt when logged in directly to the BBS without the use of any client access program!)

Please note that it is possible to also RECEIVE Winlink messages via the BPQ BBS system, but that capability is not available unless a few things happen. First, you will have to supply your Winlink login credentials (your Winlink password) to the system. You can either convey that information to the BBS SYSOP so that he might enter it into your user record, or you can enter the password using the BBS's "CMSPASS" command (without the quotes). The field is not displayed as you enter your password, so care must be taken when entering it. There may also be some other items needing configured in the BBS system to get Winlink message reception working, so contact the system's SYSOP for assistance in doing so should you encounter difficulties. Some SYSOPs make the ability to receive Winlink messages available to users, while others don't. The N8GD-3 BBS is not configured for reception of Winlink messages. To receive messages requires connecting to the N8GD-10 port of the BPQ system while using the Winlink Express program. Also, since dealing with attachments as well as templates while sending or receiving messages in the BPQ BBS interface, it is advised to send or receive messages with attachments or templates via the Winlink Express program, connecting to the systems Winlink RMS Gateway port (usually the BPQ node's base call with an SSID of "-10" – e.g. N8GD-10).

For users who wish to stay in touch with others via an RF data network on a regular or continuous basis, the use of a highly automated mail client such as Outpost or even Winlink (even with its inability to receive general bulletins) will provide the continuous access that will fulfill the needs of a user who has interest in EM-COM or ARES connectivity over longer distances and with a great frequency of regular connectivity. Yes, Winlink Express can provide manual, as needed, connectivity to a Winlink RMS Gateway, but it can also do so with a degree of automation for the end user. This can be accomplished by setting the "Polling Time" under "Settings" in your Winlink session. Even more automated and hands-free is the Outpost PMM (Packet Message Manager) system, developed by EM-COM/ARES Radio Amateurs in Northern California to fill specific local needs in that region, but which has become a widely used and very versatile system for EM-COM users in many areas of the U.S. and, I'm sure, elsewhere. So, let's take a look at a typical Outpost system:

Outpost PMM: Written and maintained by Jim Oberhofer, KN6PE, of Cupertino, California (yes, right in the middle of Silicon Valley!), this suite of programs runs as a Windows style, automated email client, very similar to the Microsoft Outlook email client (the local, installable version). You can find the program at https://www.outpostpm.org . Of course, many web-based email clients also have a folder type interface like this system, so operation by the end user becomes quite familiar and becomes very "comfortable" to use within a short amount of time. The biggest advantage of Outpost is that it automatically connects to a local Packet BBS (even the simplistic Kantronics version contained within the firmware of a typical KPC-3 type unit), and sends and receives radio email without the end user having to do anything more than check his Inbox folder periodically or compose and post messages to his Outbox folder to communicate with others outbound. It is not the purpose of this document to detail how to setup and use Outpost. That software has very complete documentation, but more recently has developed a series of "How-to" guides to get the user up and running with the various features and

configuration of Outpost. In addition to connecting to and passing messages to and from BBSes, Outpost can also connect to the Winlink system, either via a radio connection or via the Internet using a Telnet connection. Because of its Winlink connectivity, Outpost can do some limited attachment functions as well as take care of sending and receiving simple spreadsheets. There are several articles on the Outpost website detailing how to use Outpost in the Winlink connectivity mode. Suffice it to say that once you get around the initial setup and configuration of Outpost, you will find it wonderful to use because of its familiarity (as a well-know email client design) and its transparent automation in handling its various tasks, especially sending, receiving, and storing radio messages. Outpost can be described as time shifting software: It can download messages from a BBS or Winlink servers and store those messages locally, on your PC, for you to read later at your convenience!

A few points need to be made about Outpost's operation:

1. When setting up Outpost to regularly connect to a local BBS, try to limit the connect sessions to once per hour, or even more infrequently if you are not at the computer for long stretches of time (such as those Hams who work).
2. In addition to the above, if there is more than one Outpost user in a given area and those multiple users are connecting to the same BBS and are on the same frequency, they should co-ordinate with each other as to what time slot within each hour's rotation their system should connect to the BBS and make the data exchanges for mail. This is important so that the individual systems have as clear of a channel as possible (without interference from other systems) so that the data exchange may proceed as quickly and reliably as possible, providing for greater efficiency.

Using Packet Nodes to improve efficiency of a path – Many packet operators still like to use digipeaters as a means to extend the range of their connectivity. While most systems have digipeating capabilities alongside their node/switch capabilities, it is always best to utilize the node/switch capabilities of a node. So, why is that? A node is able to work in connected mode, meaning that you actually connect to the node when attempting to make a more distant connection to extend the range of your system to a distant BBS or other end-point. When you are connected to a node, it is as if you are sitting in front of the keyboard and monitor of the PC running that node software. You are then able to issue commands to connect to distant systems. In reality, that sounds like extra effort, but it is worth it. Because nodes work in connected mode, they can maintain the integrity of the data along the entire path on which it flows from initial user to the end-point, like a BBS. The data integrity is more efficient since all packets only need to be acknowledged between the various points from node to node. When utilizing digipeaters, acknowledgements must occur from end to end, user to end-point, and back, a process that may have to occur over multiple digipeated links, which can more readily introduce error into the data stream and slow the system down as it tries to get error free data passed. So, anytime you need to utilize long distance paths, use the available nodes to get to your end-point. In addition to the reliability and efficiency, many modern node systems will connect you via multiple nodes, automatically, without your having to manually enter and navigate the node paths. The available node automation can increase your enjoyment of working packet over long distances.

QUESTIONS & ANSWERS:

Below are some common questions and answers often posed by Packet and Winlink users. Other items will be added in future editions of this document as they are posed by users communicating to the author:

When would I use Winlink?

Winlink would be used when the Internet is functioning, either locally at your station, or at a distant system reachable by radio. You would then use that Internet connected system to send messages to the Winlink CMS servers for delivery to anyone in the world, including those recipients who do not have Winlink accounts or capabilities but do have Internet capabilities and Internet email addresses such as @gmail.com or @comcast.net type email addresses on the Internet. Packet mail (via BBSes) is not available to non-Hams, but Winlink is, via the public Internet network and Internet email services.

How does Winlink utilize Packet Radio?

Packet Radio, as a technical term, is a transport mode for Winlink, used primarily on the VHF bands for connectivity by users to connect to Winlink Internet enabled systems to send and receive messages over the Winlink Radio Mail system (which uses Internet for transport and storage of Winlink mail). Packet Radio, as a system, would be used whenever you wish to send a message to or receive a message from an Amateur Radio operator who has access to a Winlink system via an RF (radio) path.

Why would I use a Packet BBS?

Packet Radio, as a system, would be used whenever you wish to send a message to or receive a message from an Amateur Radio operator who has access to a Packet BBS, either directly or through access via one or more packet nodes (or, less desirable, by using digipeaters). Packet mail (via BBSes) should continue to work in the event of a wide-spread Internet outage, unlike Winlink which, for the most part, would fail without Internet access. Even though pure packet radio and its access to Packet BBSes for email is not available to non-Hams, its usefulness to Amateur Radio EM-COM and ARES personnel when the Internet has failed would be invaluable to augment their other emergency communication capabilities.

What is a Packet Transport Mechanism?

Because we throw around the term “packet” a lot, we need to clarify its definition and use. When we talk about packet, as in its use as a transport mechanism, we are talking about packet as a communication mode as we would CW, PSK, RTTY, or any other such means for transmitting data from one point to another. Winlink utilizes packet as a means to get data from point to point. This use of packet radio would be whenever you open a “Packet Winlink” session in Winlink Express. Packet radio would be the transport means to move the data from your station to a Winlink RMS Gateway and ultimately to the Winlink CMS servers on the Internet that store the messages until they are retrieved by the recipients at the same or another (distant) RMS Gateway.

What are the methods for regularly collecting mail from a local Packet BBS?

The simplest method for collecting messages from a local Packet BBS is by utilizing a TNC modem and a simple terminal program on your PC. The PuTTY (open source) or HyperTerm terminal programs (as well as others), will allow you to connect to a BBS, either directly or via nodes (or less desirably, digipeaters). Once connected to a Packet BBS, you can list all messages, your messages only, read those messages, and delete or leave them on the system (for future access before they expire). You can also read bulletins that may be of importance or as threads that others have started and commented upon. A Packet BBS can be utilized as a text-based social media platform in various situations.

A more efficient (for the operator) and fully automated method for collecting radio email from a Packet BBS is by utilizing the Outpost PMM software. Outpost is probably the best way to keep an eye on your local Packet BBS. You can also receive Winlink-based messages via Outpost, but you will miss those messages that have attachments or templates associated with them. The automation and time shifting capabilities make it a great system from the operator's point of view.

The big problem with Outpost is that it is a packet channel bandwidth hog, listing ALL your messages as well as ALL public messages every time Outpost logs on to the BBS. From a BBS SYSOP's point of view this is very inefficient and can cause problems in areas with a very busy packet data channel on VHF FM.

Also, the best way to use Outpost is on a regular basis: At least once daily, if not more often. Infrequent connections to your Home BBS (say once weekly) will result in ALL the messages that you have not seen since your previous connect being downloaded to your Inbox, and, if there's a LOT of mail, this could take a long time to download and hog up a lot of VHF Packet bandwidth in the processing of doing so! It is suggested that infrequent users refrain from using Outpost and access the Packet BBS with a terminal program.

The above situations do not apply to Winlink, but Winlink has its own limitations as well.

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