

Using Winlink ...



Configurations for Basic, Field and Emergency Communications use

With diagrams

2021 Release V1.12

With the continued upgrade and enhancements of the Winlink suite of programs the content of this document is subject to change. Please review the Winlink.org site for information regarding program changes and updates. The Google Winlink groups also announces changes and discuss issues related to using the Winlink programs.

The intent of this document is not to review the Winlink and associated programs but to highlight the uses and configurations of Winlink programs and the equipment to implement working systems.

Thanks to members of our response group and N5TW for their input and review.

Comments, questions or errors can be addressed to n5tim@arrl.net

N5TIM

This document is intended as a reference only .

Winlink Basic, Field and EmComm Hardware/Software Configurations

N5TIM-8.4.14/07-21

Winlink is ...

Winlink is a digital radio communications system that allows amateur radio operators to send and receive electronic mail (e-mail) and attachments without having a direct connection to the Internet. Winlink is a store and forward messaging system. Being able to send and receive e-mail without an internet connection is especially valuable during times of commercial communication outages. Visit www.winlink.org for additional information.

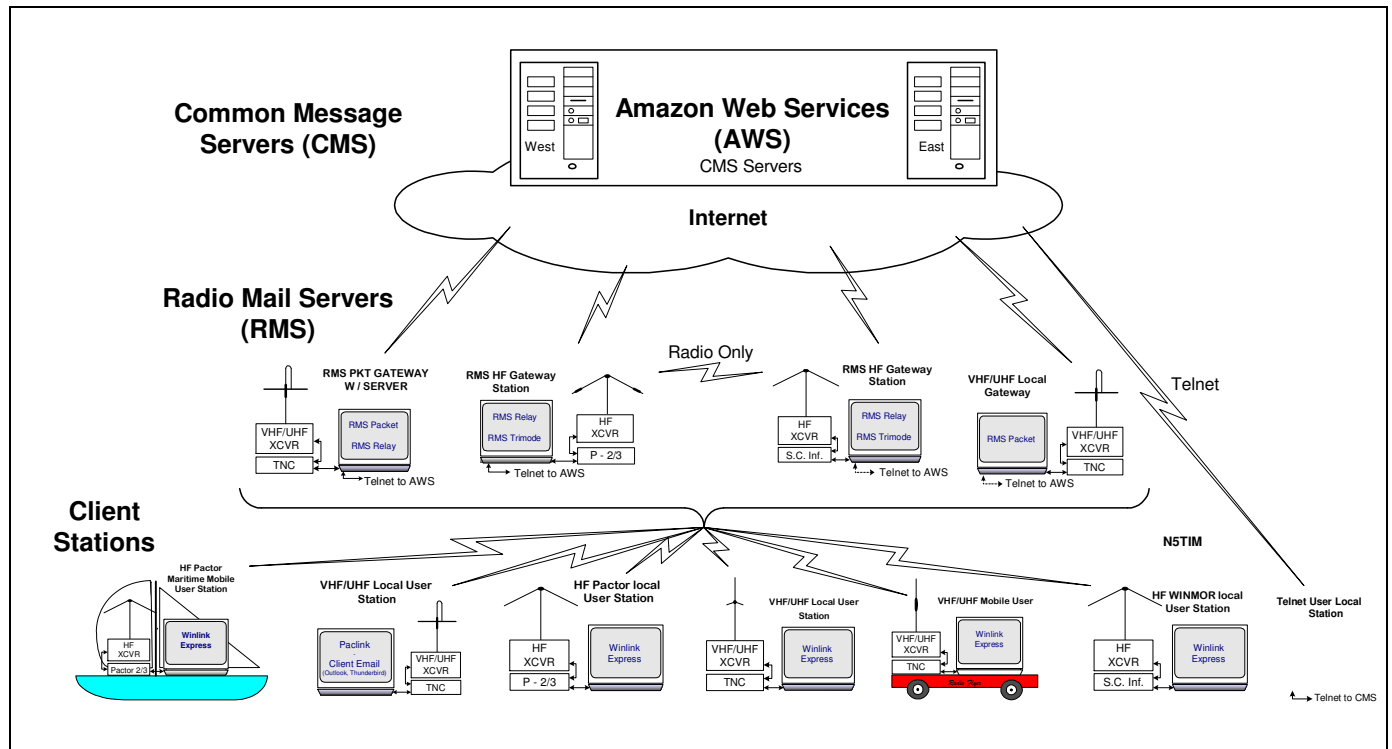


Figure 1- A global view of the Winlink Conventional Mode system. In times of Radio Only operation the message traffic never goes to the internet but is handled at the Radio Message Server (RMS) level.

- Winlink 2000 (WL2K) is a worldwide system of volunteer resources supporting e-mail by radio, with non-commercial links to internet e-mail
- These volunteer resources come from Amateur Radio, the Military Affiliate Radio System (MARS), and other non-commercial organizations. The system provides a valuable service to emergency communicators
- This network provides truly inter-operable messaging to all agencies in the same format. Winlink mixes Internet technology and appropriate amateur radio, military, marine RF and commercial technologies
- Multiple digital modes are accommodated, and the system provides radio interconnection services including: email with attachments, position reporting, graphic and text weather bulletins, emergency / disaster relief communications, and message relay
- This network provides truly inter-operable messaging to all agencies in the same format
- Winlink now supports the sound card modes for Winlink Packet and HF modes.
- The Winlink programs are always being improved so check for updates often.

1. Client Software

Winlink Express

Winlink Express is the basic work horse software used by most EMCOMM minded amateurs. It is designed to be most easily used software for single users with a single call sign. It may also be used to access one or two preset tactical addresses or alternate call signs. Winlink Express supports a wide selection of TNCs and multimode controllers. The sound card modes of ARDOP, VARA and Vara FM as well as support for HF Pactor, SCS Robust Packet, VHF/UHF packet and direct telnet to WL2K AWS servers or to amateur radio High Speed Multimedia [HSMM], D-Star DD mode, or internet connected stations. This software is used in nearly every type of client Station configurations.

Winlink Express with built in email client supports attachments, multiple addresses and tactical addresses. Winlink Express also support peer-to-peer (connecting directly via to other Winlink Express clients) HF and V/UHF modes.

Winlink Express is available at <<https://downloads.winlink.org/User%20Programs/>>

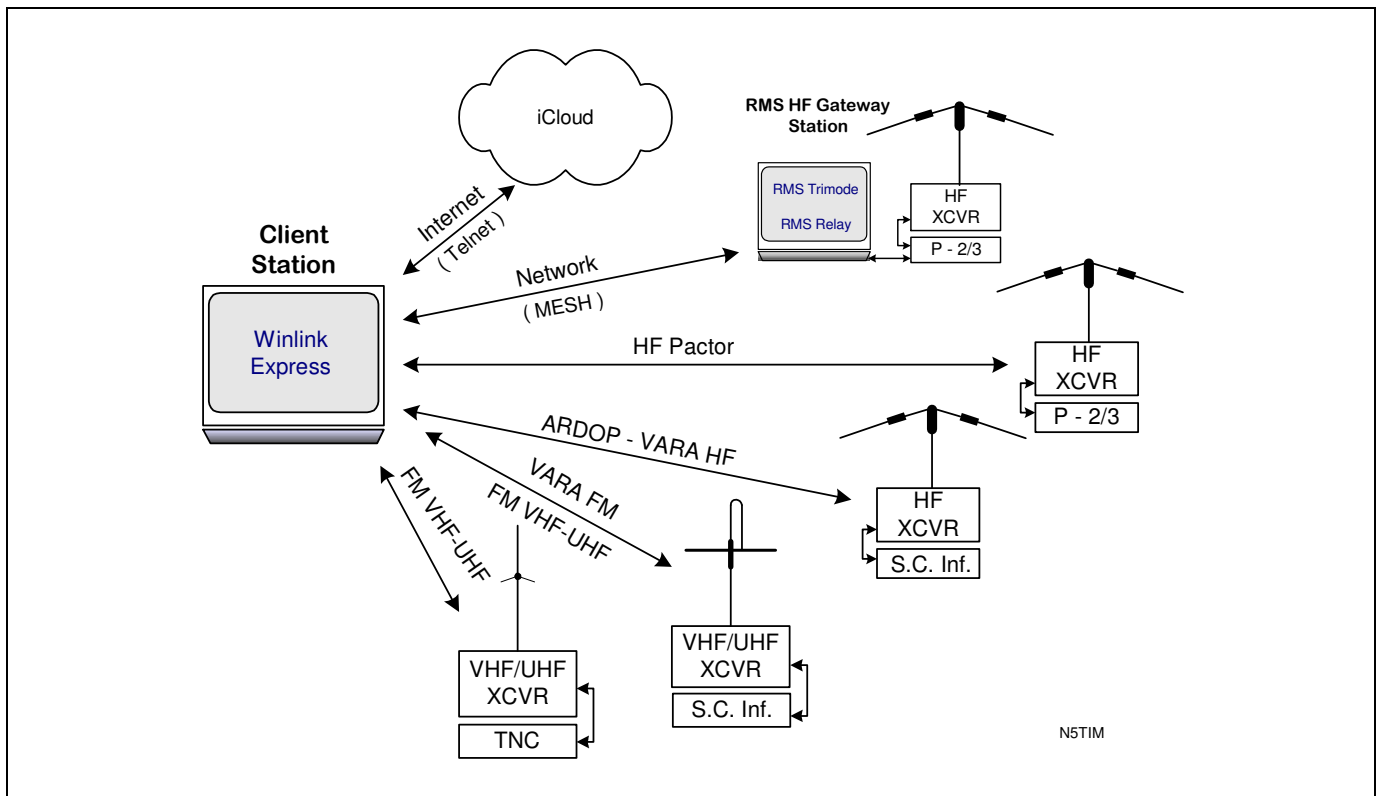


Figure 2 – The many ways Winlink Express can be interfaced to get the message through. Winlink Express is becoming the “Swiss Army Knife” for Winlink.

Note: There are many set up guides for the various sound card implementations available for Winlink Express at <https://winlink.org/content/how_recipes>.

2. Client Station Configurations

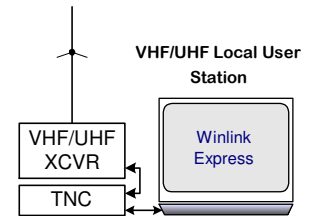
Home or Field Telnet Station

This station is a minimalist hardware and software setup for sending and receiving messages via Telnet (the Internet) with the Winlink system. A computer with an internet connection (LAN or WiFi) is required. This could be considered a Winlink Express user training setup. (Hardware = computer | Software = Winlink Express).

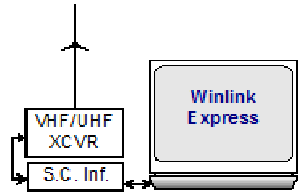


Home or Field VHF/UHF Station (Packet/Vara FM)

The VHF/UHF station is one of three basic hardware and software setups for sending and receiving messages via RF with the Winlink system. This configuration could also be used mobile and for other packet systems. (Hardware = computer, TNC, VHF/UHF transceiver | Software = Winlink Express)

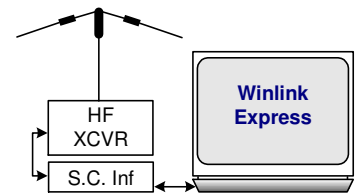


The Home or Field VHF/UHF station may also be implemented using a software Soundmodem and soundcard interface. This type of set up is not generally recommended but with the advances in sound card software may result in its use for EmComm. (Hardware = computer, soundcard interface and VHF/UHF transceiver | Software = Winlink Express and Soundmodem program)



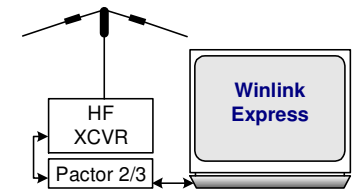
Home or Field HF Station (ARDOP/VARA)

The HF capability is the second of three basic hardware and software setups for sending and receiving messages via HF with the Winlink system. This configuration uses Winlink Express with a sound card interface. (Hardware = computer, sound card interface, HF transceiver | Software = Winlink Express and VARA software)



Home or Field HF Station (Pactor)

The HF Pactor Station is the third of three basic hardware and software setups for sending and receiving messages via RF with the Winlink system. This configuration uses Winlink Express along with a Pactor modem. Due to the cost of Pactor modems this type of station is usually found at permanent installations such as EOC's. This configuration is also recommended for EmComm deployment scenarios. (Hardware = computer, Pactor modem, HF transceiver | Software = Winlink Express)



3. Sysop Software - Radio Mail Server (RMS) Gateway Software

Winlink system administrator's approval is required for this software as well as the assumption that it operates on a 24 hour continuous day to day basis.

RMS-Packet

RMS Packet software is intended for WL2K sysops. This software supports a VHF/UHF packet radio gateway station to the WL2K system. RMS Packet stations are part of the network of participating stations, and they provide full automated messaging capability to the wireless amateur user using AX.25 packet radio in combination with the WL2K Common Message Servers. One or several RMS Packet stations may serve an area or group.

RMS Packet is ideal to provide a temporary emergency portal for radio e-mail users, or for fixed installation at unattended remote locations where it can provide wireless e-mail communications to the "last mile".

RMS-Relay (Winlink system administrator's approval is required for this software)

RMS Relay software provides temporary storage of messages and local routing in the event internet access to the AWS sites is lost. It will normally only be used with co-located RMS Packet and Trimode programs. (Co-located means on the same computer, LAN, or short distance Ethernet links.) The relay program becomes a local server when links are lost to AWS sites. RMS Relay now supports automatic forwarding.

RMS Relay Operating Modes

- Only accept connections if Internet is available -- If an Internet connection is available, RMS Relay acts as a conduit from the RMS program to the Internet and the AWS. If the Internet connection is down, RMS Relay refuses connections from the RMS program, so the program rejects connections with the message "No AWS available". This would be essentially how the RMS Packet or RMS Trimode would operate if not using RMS Relay. This mode must not be selected if you wish to participate in the Winlink Hybrid Network.
- If Internet is not available, accept only radio-only forwarding connections and deny CMS connections -- If an Internet connection is available, RMS Relay accepts both radio-only forwarding connections and normal connections wishing to be passed to the AWS. If the Internet is not available, then RMS Relay continues to accept radio-only forwarding connections, but any connection attempting to reach a CMS is rejected with an error message saying that there is no Internet connection to the AWS. This is a good choice for RMS that are serving both EmComm and maritime users, because it prevents important messages from the maritime users from being delayed within the RMS if the Internet connection is down. This operating mode is strongly recommended for ham RMS operating as hybrid stations that are using manual message forwarding, since the time that a message may be held before it is forwarded could be very long.
- Radio-only, local message hub -- When this mode is selected, RMS Relay does not forward messages through the Internet to a WL2K AWS even if it is available. All messages are stored in a local database or forwarded via radio through the Hybrid Network. The primary use of this option is for RMS that are operating at sites that do not have Internet connections.
- Hold for Internet access -- If an Internet connection is available, RMS Relay passes the message through the Internet to the AWS. If the Internet connection goes down, the RMS Relay stores messages in a local database until the Internet connection is restored at which time I sends them to the AWS. If the station is participating in the Hybrid Network, messages will be forwarded via radio to another RMS. Buffering by RMS Relay can cause unexpected delays that might be unacceptable for emergency messages. This is the recommended mode of operation.
- Stand-alone Network "Post Office" -- If this mode is selected, RMS Relay operates as a simple message repository post office. It does not upload messages to the AWS, and it does not forward them via radio. Trimode and VOACAP do not need to be installed, and there is no need for a radio. The computer also does not need to be connected to the Internet. This operating mode is intended for use in MESH and LAN networks, but it can be used in any context.
- RMS Relay also supports SMTP, POP, and IMAP connections.

RMS Trimode (Winlink system administrator's approval is required for this software)

RMS (Radio Mail Server) Trimode is software intended for WL2K sysops who operate High-Frequency gateway stations. These RMS stations are part of the controlled global network of WL2K participating stations. RMS Trimode is the only Winlink program that does not use a SSID.

RMS Trimode is a flexible HF Radio server for Pactor (USA P1-P3), ARDOP and VARA sound modem and the Robust Packet HF protocols. RMS Trimode can be used for any one, two or all of the above protocols simultaneously and can scan multiple frequencies adjusted by time of day. A single instance can support Amateur, MARS and EMCComm applications.

The objective of RMS Trimode is to allow sysops to use one program that supports multiple user protocols using the same radio, antenna, and computer resources. This gives users more connectivity options and makes better use of limited spectrum.

Once a connection in one protocol is established RMS Trimode will block other connections on the remaining protocols until the session is completed. If desired a single instance and radio can support multiple call signs and service codes. RMS Trimode may optionally use the program RMS Relay with a local message database to temporarily buffer messages if internet connectivity is lost. Sysop approval is required for this software.

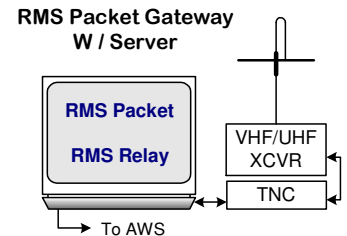
4. Gateway Station Configurations

RMS* Packet

The RMS Packet Gateway Station is the radio link between a client VHF/UHF/WiFi/DD stations and a telnet/internet connection to a Common Message Server (CMS) or an RMS Relay module. The Gateway may be co-located at a client station or a separate secured site. Gateways operate 24/7/365 and require SysOp authorization. In the absence of the internet the Gateway becomes a server for local users if RMS Relay is used. RMS Packet also works with AGWPE (multiple TNC driver utility) to provide multiple radio channel connections. RMS Packet may be used without RMS Relay if the intent is to only provide CMS access via the Internet. These stations usually use a SSID of -10. (Hardware = computer, VHF/UHF transceiver, TNC | Software = RMS Packet and RMS Relay) *

Radio Message Server (RMS)

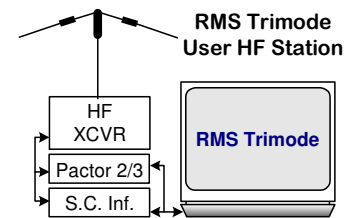
Note: RMS Packet can now be used with a sound card interface.



RMS Trimode

This is the latest in the Winlink evolution of user software/hardware for sending and receiving HF radio email. This station configuration has the capability of running four types of configurations. ARDOP, VARA HF, Pactor and Robust Packet. It can be programmed to step through the different modes using a single HF radio and computer. This type of station is usually located at a fixed location and provides CMS access 24/7. (Hardware = computer, HF transceiver, Pactor modem and/or sound card interface | Software = RMS Trimode)

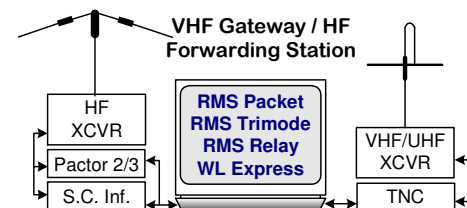
Note: No SSID is used with RMS Trimode and only one service code should be entered.



5. Unique Sysop Configurations (Radio Only or EMCOMM focused)

VHF Gateway / HF Forwarding Station

A portable station running RMS Packet, RMS Relay and RMS Trimode that can provide local server capability, send and receive email messages via VHF/UHF radio. Using RMS Trimode, the station HF radio can be used to forward messages outside the local area via Pactor, ARDOP or Vara. This function may be referred to as a Store and Forward station. By adding Winlink Express a local message capability is enabled. This setup is typically used by the Rapid Response Task Force Amateur Radio attachment, the Rapid Deploy Communications Assistance Group, a North Texas Section ARES Team (RRTF/RDCAG) and mutual assistance teams. (Hardware = computer, HF transceiver, Pactor modem or sound card interface, VHF/UHF transceiver, TNC | Software = RMS Packet, RMS Relay and RMS Trimode - optionally Winlink Express)



Winlink Express, RMS Packet, RMS Trimode and RMS Relay programs internal communications paths

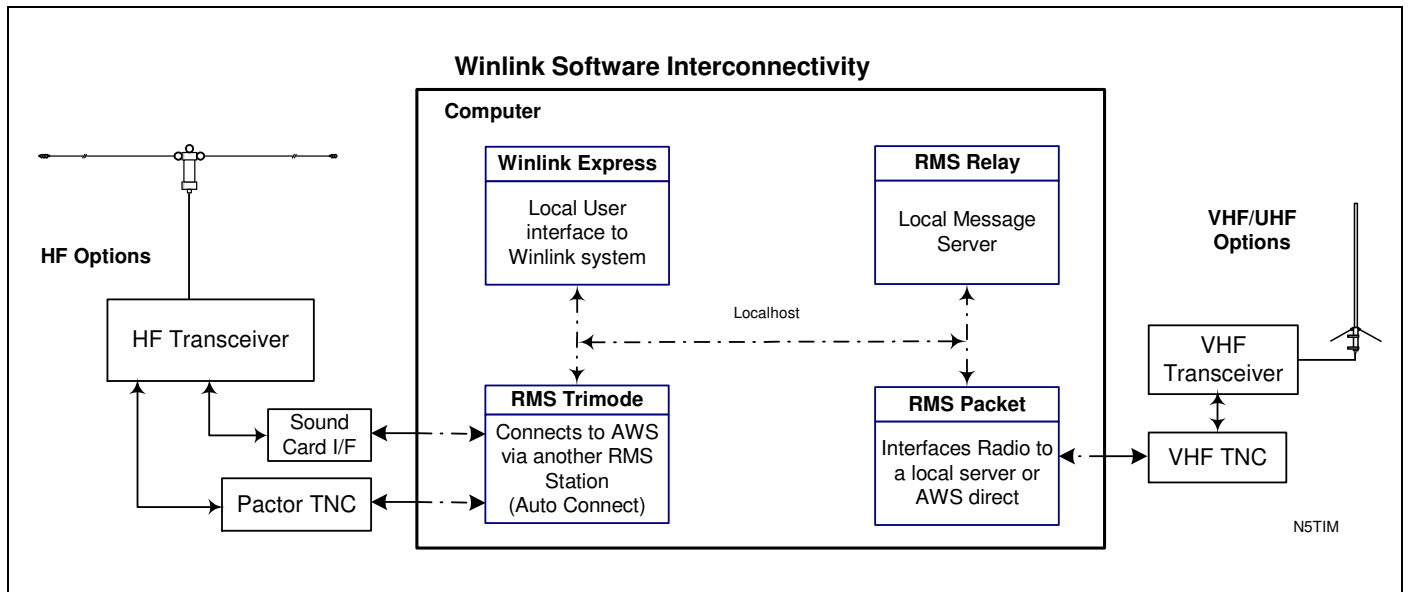


Figure 3 – Internal communications path between each of the software packages. If Winlink Express is used in a configuration such as this it should be set to use RMS Relay (Field Ops).

RMS Packet Dual Mode and optional RMS Relay programs internal communications paths

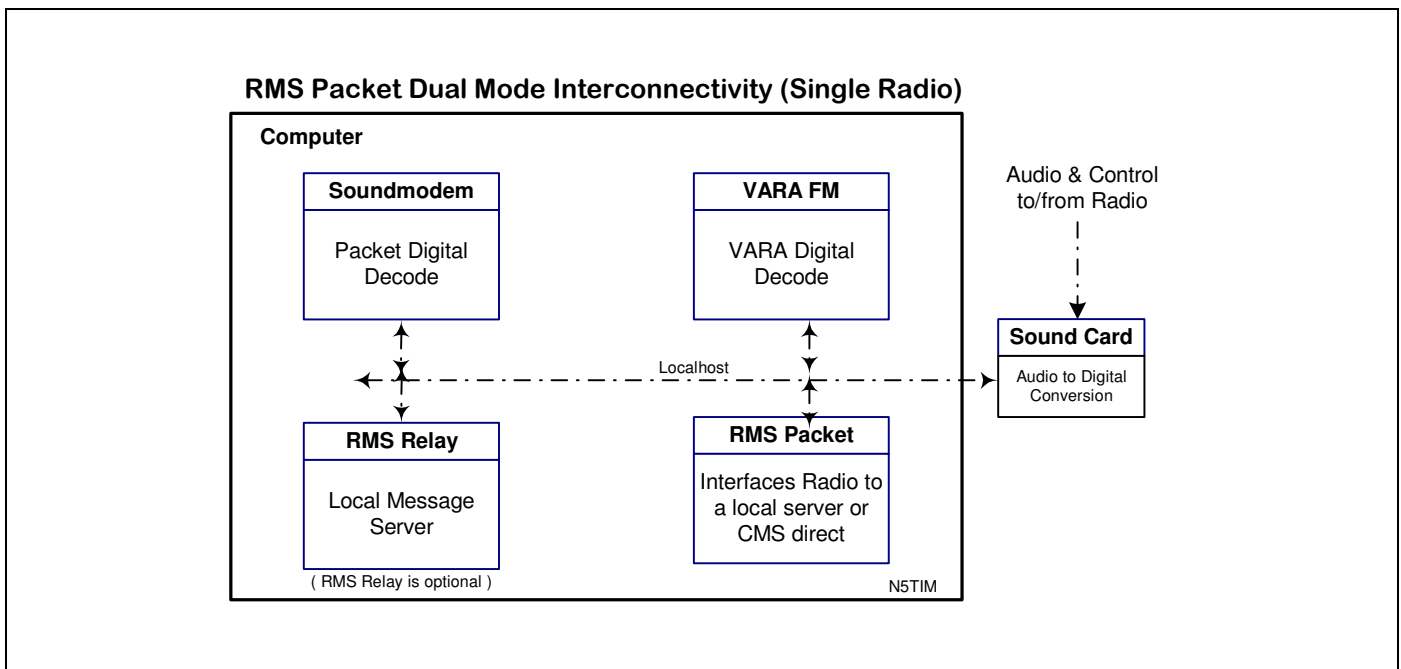


Figure 3a – Internal communications path between each of the software packages implementing a dual Mode, one Radio RMS Packet Station. This is not an ideal configuration due to potential collisions of the modes. Details on implementing this configuration are in the Winlink Book of Knowledge.

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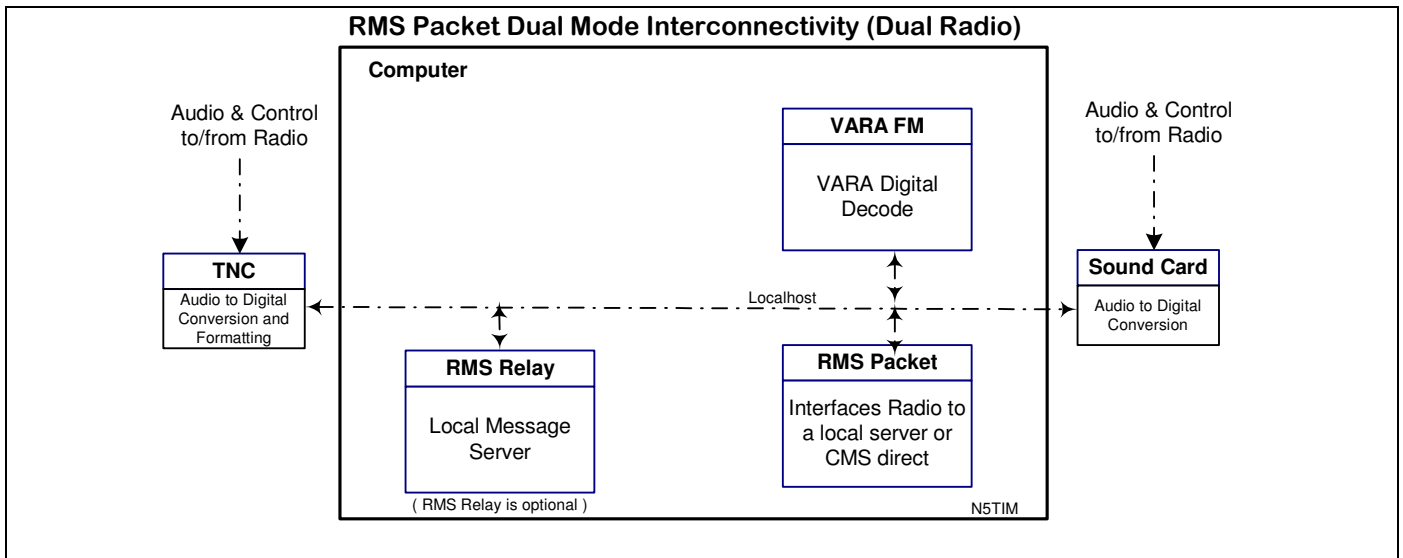


Figure 3b – Internal communications path between each of the software packages implementing a dual Mode, dual Radio RMS Packet Station. This is a slightly improved configuration over figure 3a. The best way is to use two instances of RMS Packet especially if this station is to be used in high traffic areas or where frequency congestion is a problem. In this case the second node could use a UHF frequency. 1200 baud equipment works well on UHF.

Designated Station

At times, generally during EMCOMM situations a station may be tagged with the term “Designated.” This indicates that the station has been identified as a hubbing station for a local area, a specialty station serving a specific task or a station with unique capabilities. Designated stations are typically listed in the Action plan and the ICS-205A documentation. The use of designated stations is also a means to manage the bandwidth of a band typically used for EMCOMM communications.

Winlink Hybrid Network (See Winlink Express help file for detailed explanation)

Winlink offers a Pactor radio-forwarding mode that transfers messages from an RMS that doesn’t have Internet to another RMS that has Internet and/or to an RMS where the recipient can pick them up. This mode of operation can operate with local and total Internet outages.

The term “Hybrid Mode” refers to an RMS configured to operate in Conventional Mode when it has Internet access and to switch automatically to Radio-Forwarding Mode if it loses the Internet connection.

Radio-Only

Radio Message Servers (RMSs) typically run in normal Winlink Internet mode and can switch automatically to radio-only network mode to forward radio-only messages. These stations are not dependent on the internet to move messages. There are stations in the network that are radio only and they can communicate with stations that do have the internet or are also radio only to deliver the message. Users can now select in Winlink Express Message Pickup Station(s) (MPS) to have radio only messages sent to for pickup. RMS Relay can be used to configure a Radio Only station. Users connect using one of the HF Digital modes while Pactor is used for backbone links. Read more in the RMS Relay help files. Radio Only operations are at the RMS level.

Modes of Operation

Packet - The original AX-25 1200 baud hardware unit known as a Terminal Node Controller (TNC) and has been around for over 30 years. Supplied by a number of hardware vendors. Newer units if added could provide 9600 baud speed.

Packet Soundcard - Winlink Express now easily interfaces with sound card devices using 'hooks' in its software to interface to Soundmodem a program developed by UZ7HO. This works with conventional AX-25 1200 baud systems as well as several higher speed sound modem devices.

WINMOR - A first generation sound card program developed by the WDT. Has been depreciated due to the speed increase provided by ARDOP and VARA HF.

ARDOP - A second generation sound card program developed by the WDT. It can reach speeds exceeding Pactor II. It is embedded in Winlink Express.

Pactor - An HF mode using proprietary software providing four levels of speed from Pactor I to Pactor IV. The device is a hardware TNC and is a product of a German firm. An excellent mode for high speed message delivery.

VARA HF - A high speed DSP soundcard program developed by EA5HVK. It is a standalone program with links for Winlink Express. Speeds exceed Pactor III and excellent copy in noisy conditions. Also has a neat set of set up features

VARA FM - A version of VARA HF that is optimized for UHF/VHF FM use. It many of the features of VARA HF and provides speed increases over packet. Seems to work more efficiently with large files.

11. RMS Packet Frequency Coordination

RMS Packet frequencies should be coordinated over an area for both physical coverage and bandwidth. Local areas should have default RMS Packet coordination plans to maximize bandwidth and coverage. For example, an RMS Packet on a frequency with wide area coverage might be reserved as a key hubbing station.

A viable solution is the Quad plan as implemented by Bruce Dingman, N5BYL of Collin County, Texas ARES. The proposal divides the county into four sections, NW, NE, SE and SW. A common RMS Packet frequency is assigned to each quad. Each County uses the same quad frequency plan. This should minimize “crashing” between RMS stations that are co-located within a multi county area. This may not work everywhere, but should help in most. The Quad frequencies are; A) 144.910, B) 144.930, C) 144.950, D) 144.970, E) 144.990, F) 145.030, G) 145.050 and H) 145.070. A, B, C and D are assigned to the four quads as shown below. A wide coverage centrally located or Hubbing RMS Packet station would use one of the remaining frequencies or one of their choosing. Adjacent Counties with wide coverage stations should coordinate the central station frequency to avoid interference.

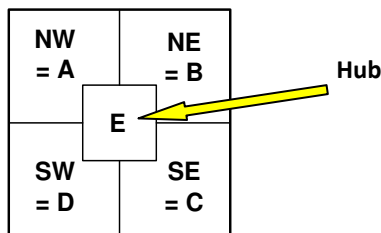


Figure 15a - Example of County sectioned per the Quad Plan. Central/Primary Hub RMS optional.

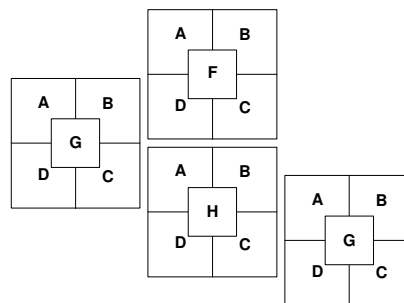


Figure 15b - Example of four adjacent Counties each using the Quad Plan.

Note: There are now soundcard software interface solutions for hardware interfaces used with Winlink programs.

6. HF Digital Frequencies:

There are so many digital activities on the bands that it is hard to declare any frequency open offhand. Operators are strongly advised to listen, really listen before transmitting. You should be aware of skip zone effects when operating above critical frequencies and move elsewhere if another signal appears after listening for a while and transmitting.

HF Digital Frequencies Band plan (In kHz)			
BAND	Allowable Frequency Range for Data (Winlink courtesy)	Frequency range for Pactor 1 & 2, ARDOP and VARA HF Narrow modes* (500 Hz)	Frequency range for Pactor 3 & 4, ARDOP and VARA HF Wide modes** (1600Hz)
160M	1800.000 – 1810.000	1800.000 – 1810.000	---
80M	3570.000 – 3600.000	3570.000 – 3600.000	3585.000 - 3600.000
40M	7070.000 – 7105.000	7070.000 – 7125.000	7100.000 – 7105.000
30M	10130.000 – 10150.000	10130.000 – 10140.000	10140.000 - 10150.000
20M	14070.000 – 14150.000	14070.000 - 14095.000	14095.000 - 14099.500 14100.500 – 14112.000
17M	18100.000 – 18110.000	18100.000 - 18105.000	18105.000 – 18110.000
15M	2107.000 – 21100.000	21070.000 – 21110.000	21090.000 - 21100.000
12M	24920.000 – 24930.000	24920.000 - 24925.000	24925.000 – 24930.000
10M	28070.000 – 28300.000	28070.000 – 28120.000	28120.000 - 28189.000

*Operating frequency must be outside the automatic data portions of the band and within normal data portions of the bands. Automated data operation on 160M is not allowed.

**Operating frequency must be within the automatic data portions of the selected band. To date Pactor 4 is not allowed in USA. Per FCC 47 CFR 97.221, automatic Data stations in these frequency ranges are limited to a 500 Hz bandwidth.

NOTE: The use of the 160Mhz band is discouraged for EmComm use unless in a dire emergency.

60M* BAND (operation is permitted on a secondary basis)						
	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5	Notes:
Dial Frequency	5330.500	5346.500	5357.000	5371.500	5403.500	USB limited to 2.8KHz Bandwidth All modes USB only
Center Frequency	5332.000	5348.000	5358.500	5373.000	5405.000	

*CW & Digital emissions must be centered 1.5 KHz above channel frequency, MRP 100W PEP and only one signal at a time is permitted. Automated data operation on 60M is not allowed. Band is channelized.

7. VHF/UHF Packet Frequencies:

- **2 meters (VHF):** Baud rate is 1200. The most common frequencies are 144.910, 144.930, 144.950, 144.970, 144.990, 145.010, 145.030, 145.050, 145.070, 145.090 and 145.530. Others may be selected anywhere between 144.900 to 145.100 and 145.500 to 145.800. (coordinate with local band plans)
- Avoid the 145.800 to 146.000 and 435.000 to 438.000 portions of the band segments.
- **70 cm (UHF):** The packet allocation for the band (mixed mode segment) is 432.10-432.30 and 432.40-433.00. Packet should not be used below 433.00. By local option, packet could also be used from 442.000 to 445.950 and 446.100 to 448.000. 441.000/.025/.050/.075, 440.975 and 446.150 are possible selections. Baud rate may be 9600 or 1200. Some areas have set specific frequencies for 9600 baud RMS Gateways (440.9875,441.0375,441.0625,441.5250 for Gateways).(coordinate with local band plans)

8. Typical Operational and EMCOMM Configurations

The following figures and diagrams are a few representations of various ways basic stations can be put together to create systems for both normal and emergency digital communications.

VHF/UHF and HF Peer to Peer Configurations

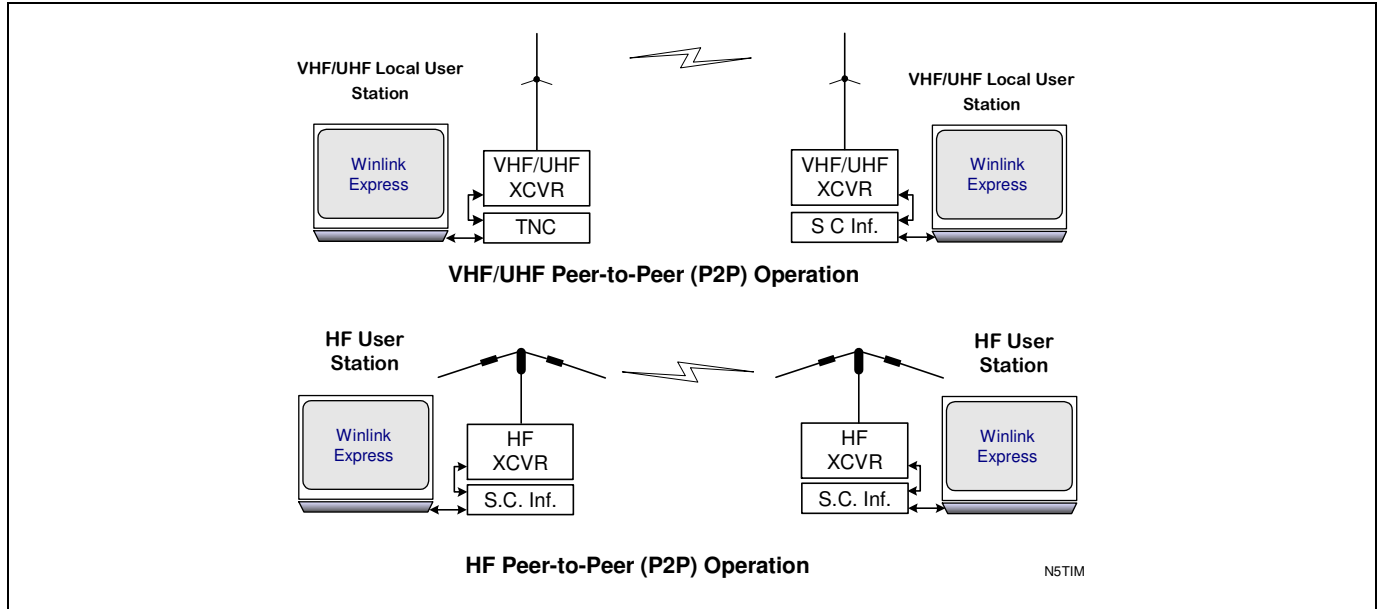


Figure 4 – The simplest configuration is the Peer-to-Peer messaging between two stations operating on the same frequency and at the same time. Timing and frequency for this type of exchange is generally planned over a voice frequency or with a standing plan. This function can be implemented between VHF/UHF or HF stations using a voice frequency for coordination. This is a non-preferred set up for EmComm use due to the additional use of bandwidth to set up contacts. Each station must use peer-to-peer messaging.

A local RMS VHF/UHF Gateway/Local Server Configuration

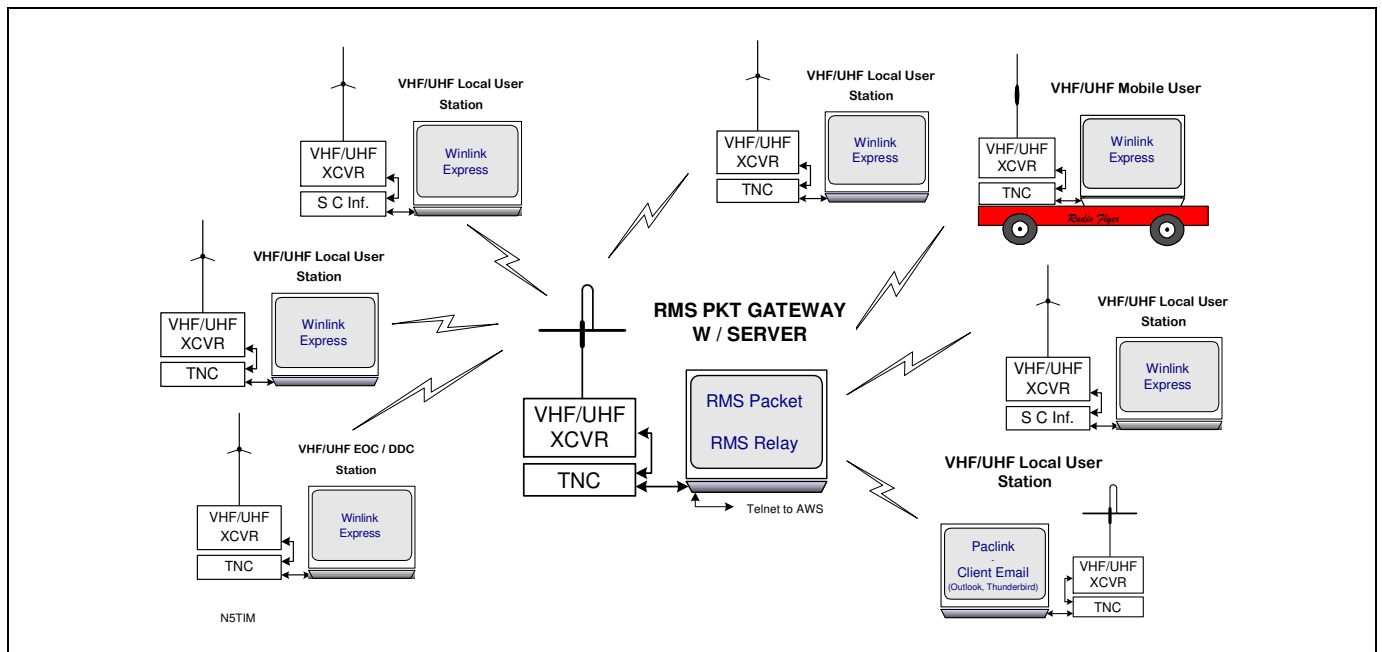


Figure 5 – A typical system configuration of a county or city level digital messaging set up used for normal routine digital operations from local user locations with only a single gateway available. In a situation where connection to the AWS (Internet) is lost, the Gateway becomes a local message hub or server using RMS Relay. This could also be viewed as a tactical digital deployment where all stations are portable in support of a local EOC or DDC.

Local VHF/UHF to HF Forwarding Configuration

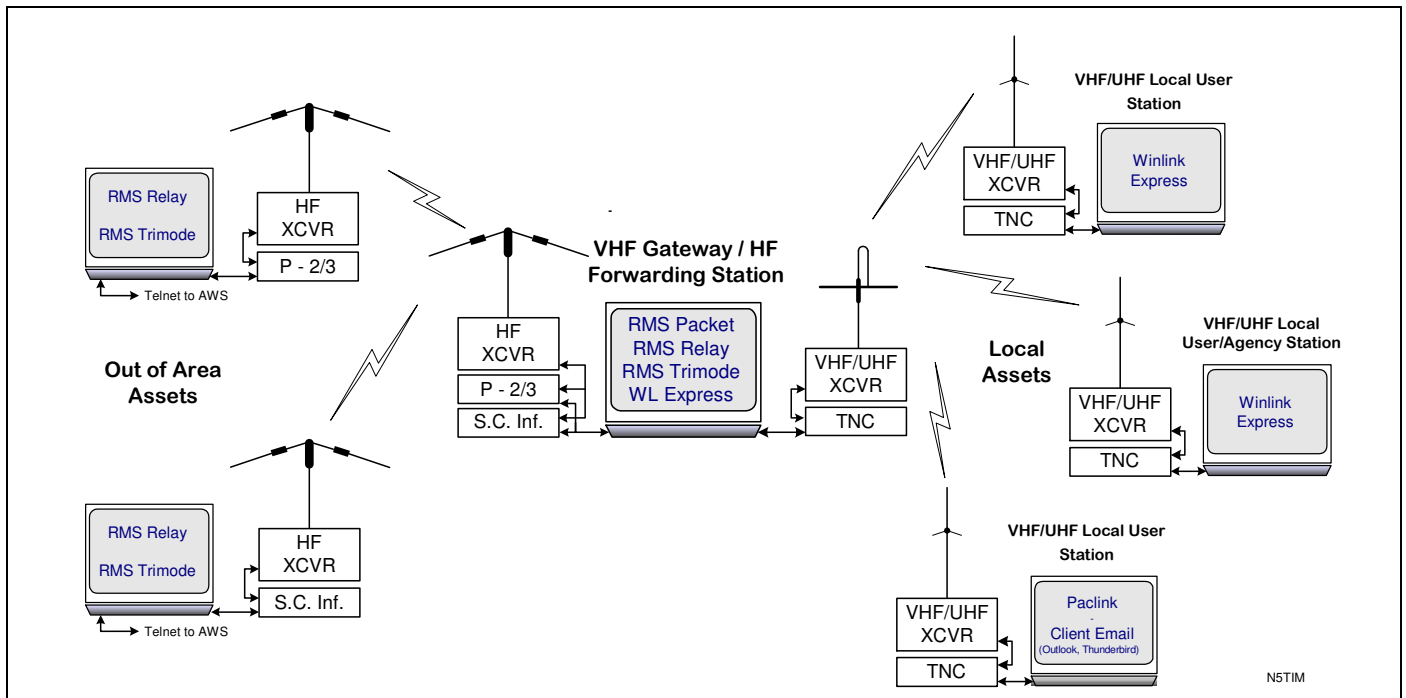


Figure 6 – System configuration showing how a forwarding station plays into the overall communications plan. This is a typical down range or forward area deployment “Store-and-Forward” feature of the Gateway and Forwarding Station. RMS Trimode is used to manually initiate HF forwarding. The store-and-forward station may also run Winlink Express for local message receipt and transmission by the gateway operator. Now with automatic forwarding.

Another configuration for message forwarding

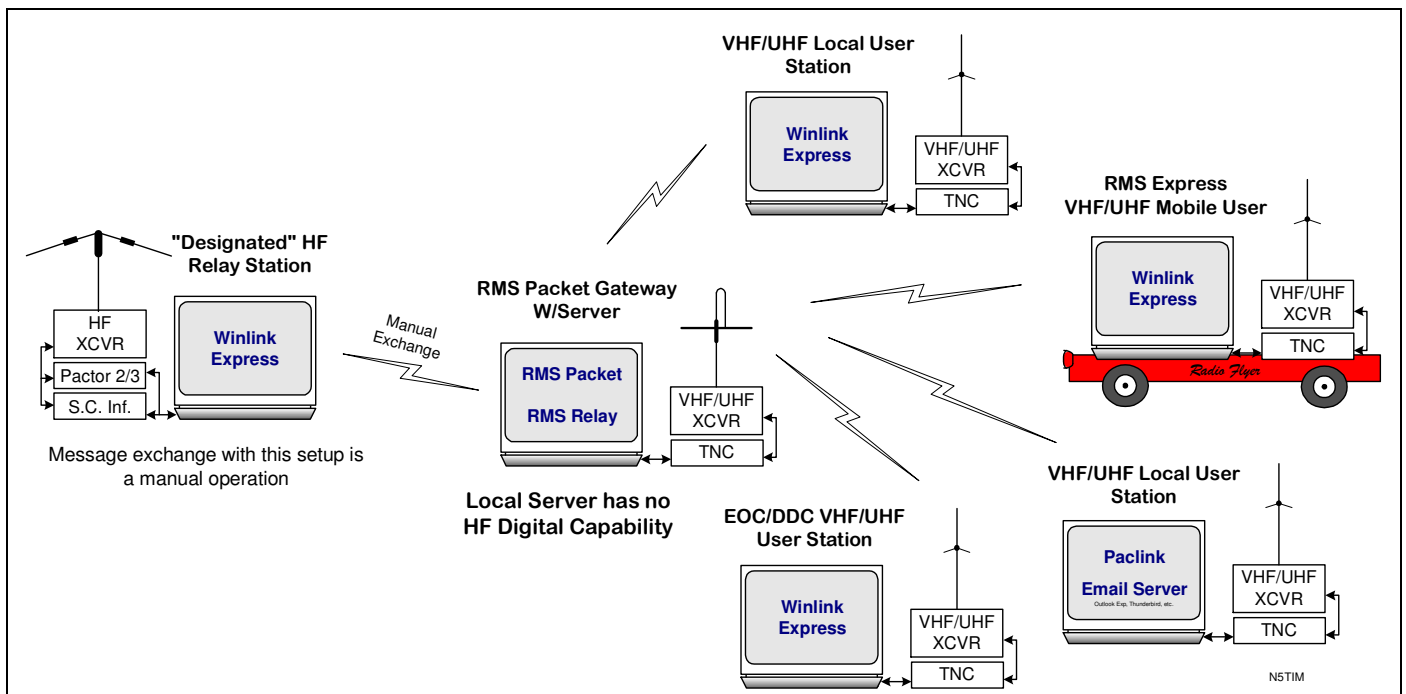


Figure 7 – Typical system configuration for a Designated HF Digital Relay Station. The station provides out of area connectivity for local systems that do not have HF Digital capability at the gateway server location. The connection between the gateway server and the relay station can take many forms. The station is “designated” by the local leadership and the station call is communicated on voice nets and in an ICS-217 and/or ICS-205A.

Remote user options configuration

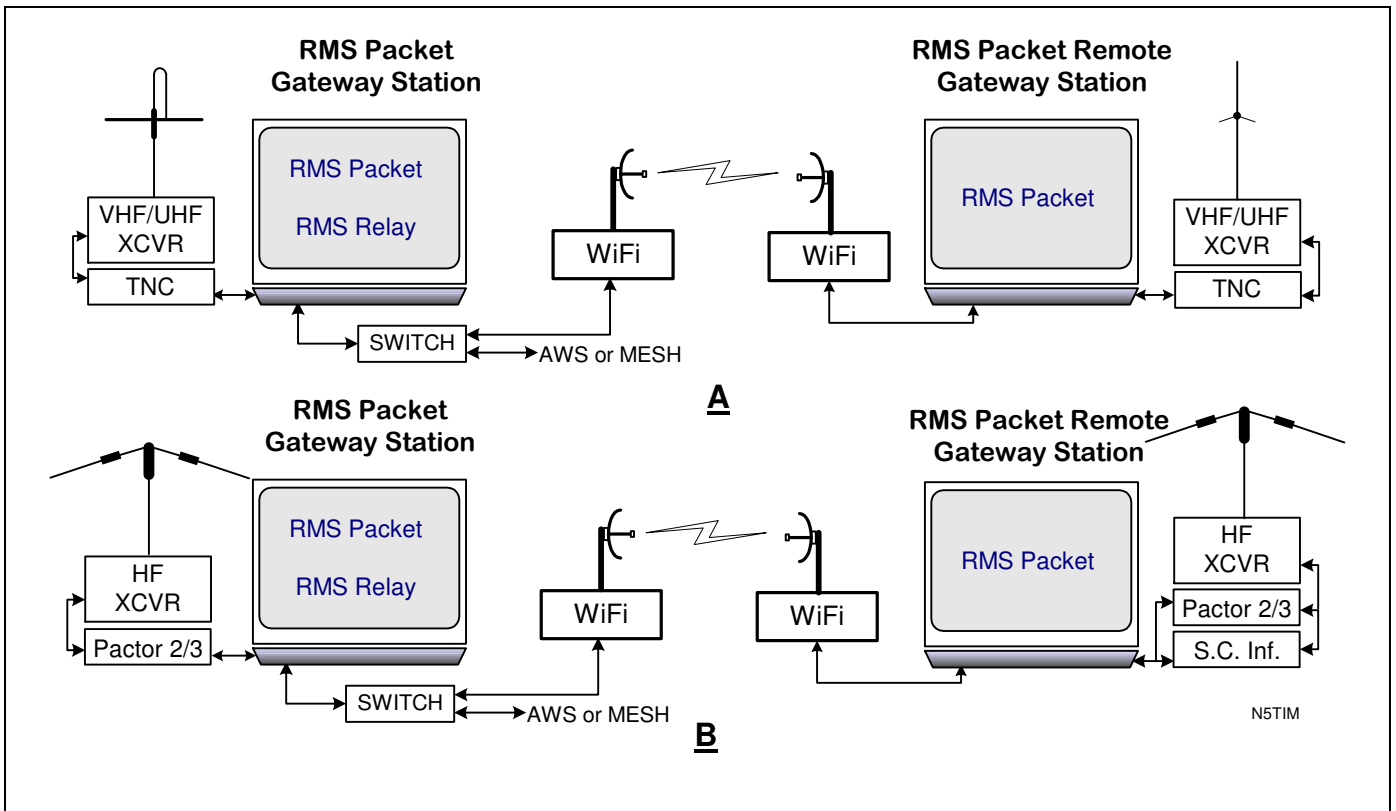


Figure 8 – Using a WiFi or MESH you can set up a remote Gateway station at a distant location without internet access that homes in on a Gateway station with internet connectivity. This function works both with VHF/UHF (A) and HF Gateways (B). Additional remote Gateway stations can be added by using the appropriate equipment.

Configurations using a network or Mesh for messaging

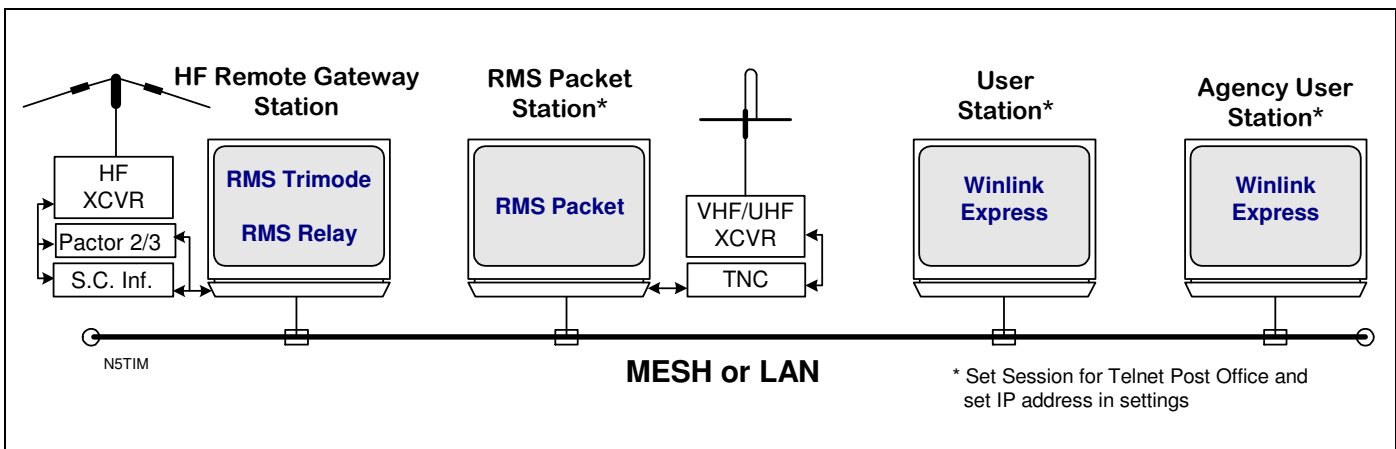
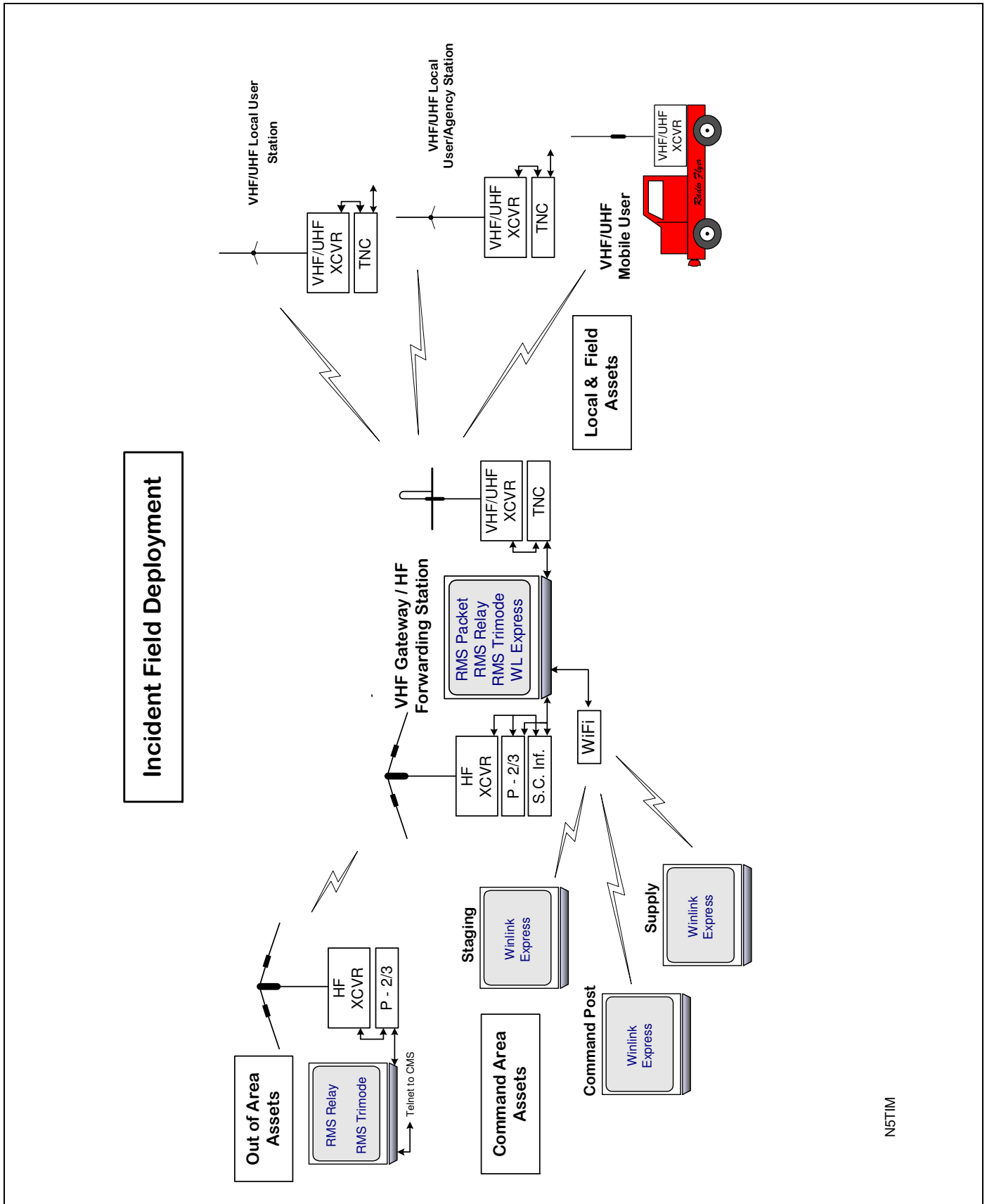


Figure 9 – Using MESH or LAN the Telnet Post Office Mode can access a remote Gateway from local VHF/UHF stations or user stations at remote location without internet access that homes in on a Gateway station with HF capability. This function can work with either VHF/UHF or HF Gateways. Additional remote User stations and/or RMS Packet Stations can be added by using the appropriate equipment.

Incident Deployment Configuration



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Figure 10 – A potential full field deployment configuration consisting of various communication assets.

Multiple instances of RMS Packet on a single computer

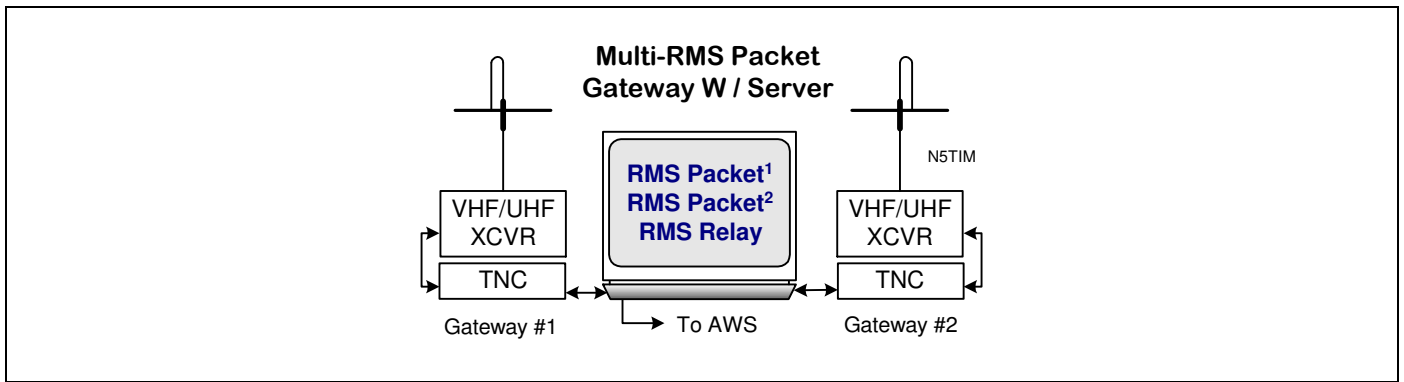


Figure 11 – Multiple radio/TNC set ups are connected to a single computer and share a common instance of RMS Relay. For each radio/TNC set up, a separate instance (folder) of RMS Packet is installed. All instances of RMS Packet home in on a single instance of RMS Relay. In setting up each instance of RMS Packet it is best to use the IP address of the local host rather than using "localhost."

A MESH configuration supporting multiple users

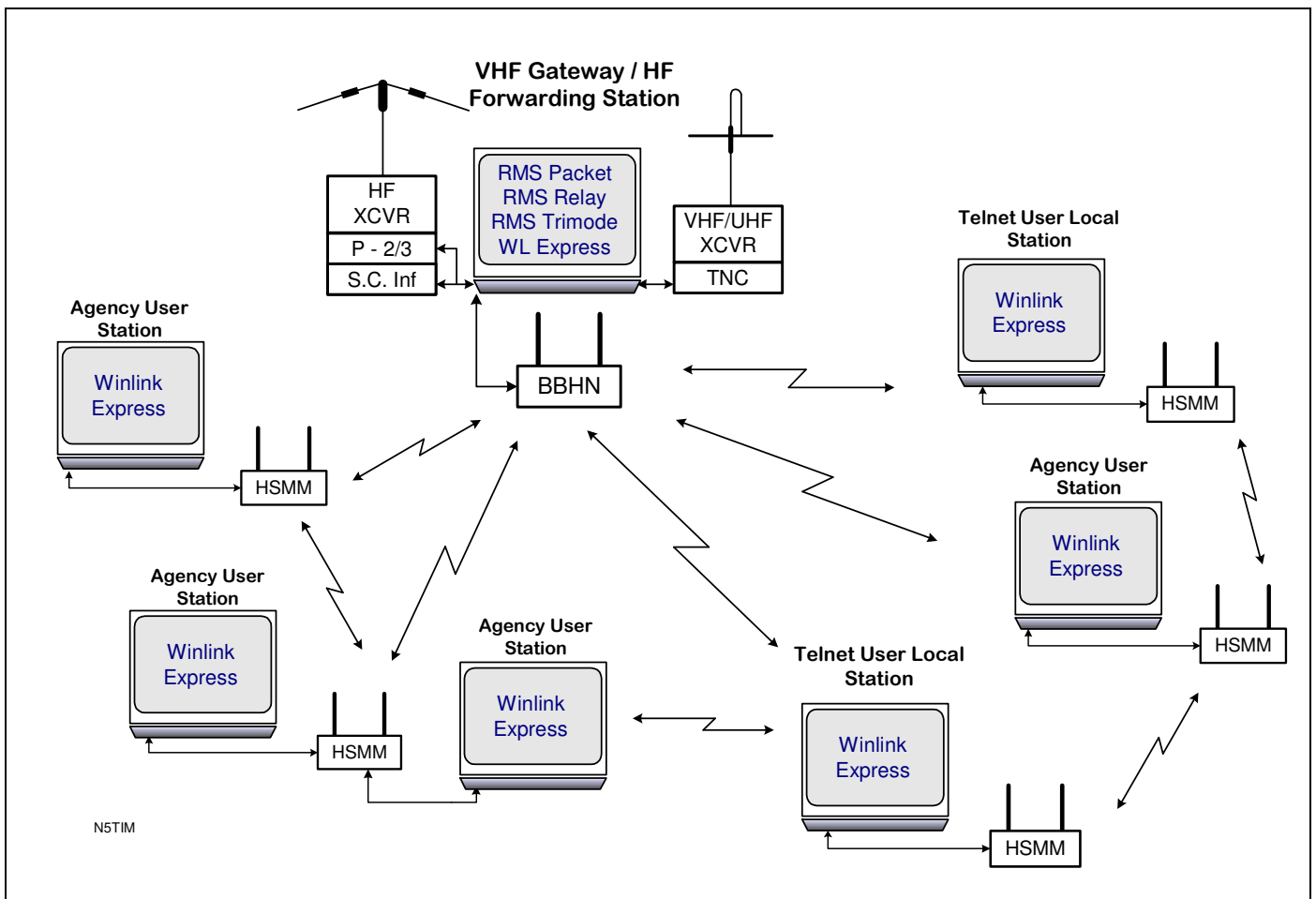


Figure 12 – Another suggested way to add non radio equipped agency and local user stations to a designated HF/VHF Forwarding station using a Broadband Multimedia MESH network. All user stations are running Winlink Express with "use RMS Relay" checked and are connected to a MESH node. A switch could be used in lieu of MESH in close in settings or an EOC to link stations.

Adding support for your local served agency

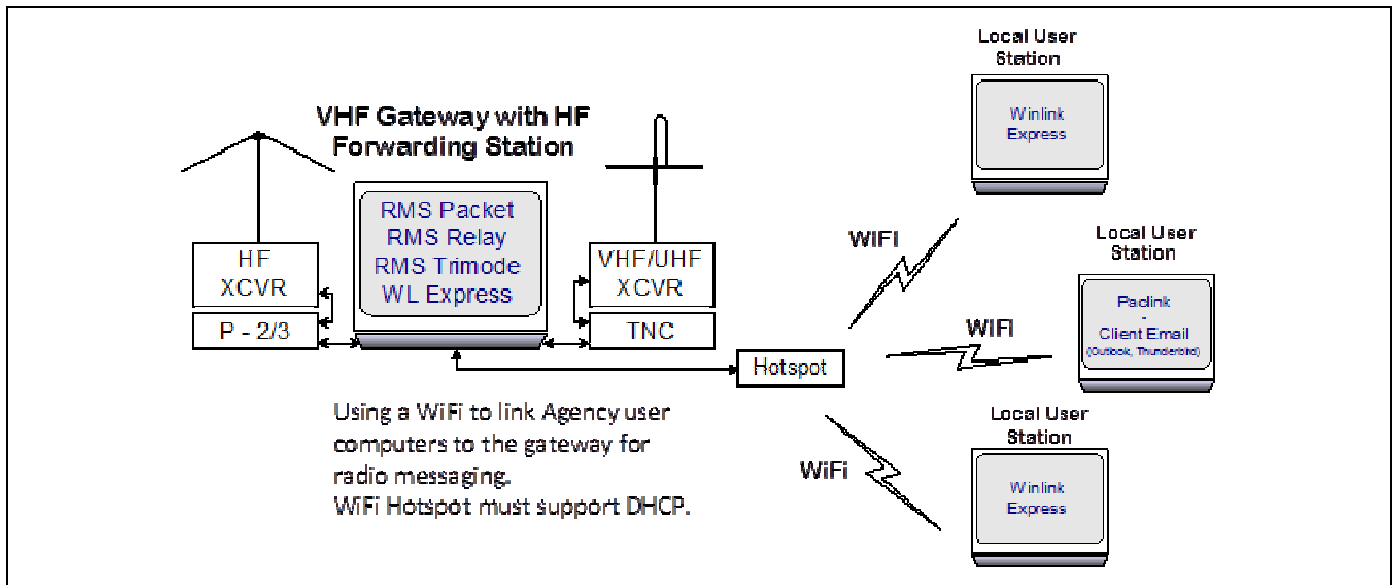


Figure 13 - A suggested way to add non radio equipped agency user stations to a designated HF Forwarding station using WiFi, a switch or similar networking equipment. WiFi would be best used for an open area command post location while a switch would be better for an in house or EOC setting. All agency user stations are running Winlink Express with “use RMS Relay checked” to connect to the Gateway Station. In addition local VHF Winlink Express station operators can deposit and retrieve messages via the RMS Packet VHF equipment of the Forwarding Station.

Digipeating with a Software Node Controller (SNC) and Sound Card Interface.

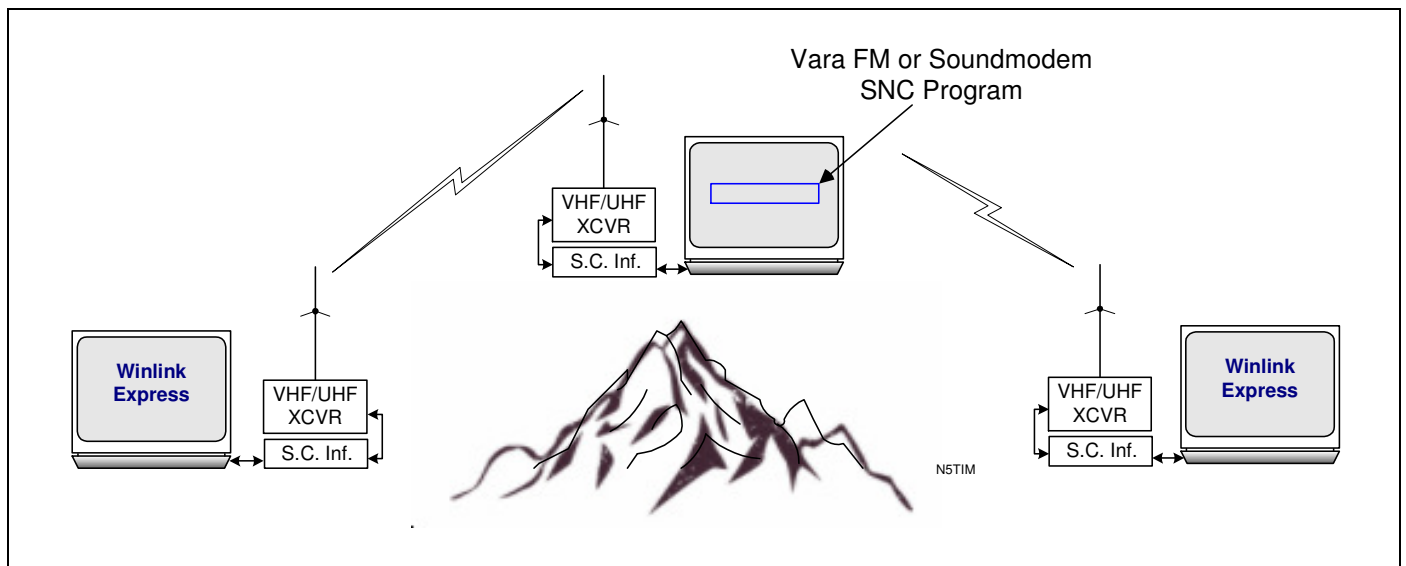


Figure 14 - UHF/VHF Digipeating is one way to overcome distances and obstacles with intermediate nodes. In both Vara FM and UZ7HO's Soundmodem programs there is a digipeat feature. Most TNCs also have this feature. This feature is a standalone feature that does not require a Winlink program to operate. This feature can also be used in conjunction with a normal Winlink Express Packet using Soundmodem or Vara FM station nodes. The SSID should be different from the Stations SSID. Works with P2P and RMS Packet. The digi node doesn't require a VARA license, but, connecting stations need a VARA license to connect.

9. Sound Card Programs and Interfaces

Winlink users more and more are beginning to use the available "soft TNC" or sound modem programs rather than a hardware TNC. There are pro's and con's regarding the use of these programs regarding their reliability and

decoding capability vs. the hardware TNC. Most have "hooks" that make it easy to interface to the Winlink programs. If choosing to use this method on interfacing, the hardware between the computer and radio still has to be considered. The use of interfaces that provide the PTT capability are usually the best choice. Others do not provide this function and rely on VOX to key the radio. An additional item to consider is to choose an interface containing the sound conversion function rather than relying on the computer to provide this function. It just increases the burden of work for the computer. (see Figure 18 for a minimal Software Node Controller interface)

Sound Card Modes

- ARDOP
- VARA HF
- VARA FM

Typical Software Node Controller Software; (External to Winlink Express)

- UZ7HO Soundmodem - <<http://uz7.ho.ua/packetradio.htm>>
 - ptt-dll.zip file is required for C-media interface modules.
- DireWolf soundcard modem - <<https://github.com/wb2osz/direwolf/releases>>
- VARA HF
- VARA FM

Typical Software Node Controller (SNC) Hardware;

- Signalink - <<http://www.tigertronics.com/>>
- Rig Blaster - <<http://www.westmountainradio.com/rigblaster.php>>
- Google search for DIY interface suggestions
- Radio Interfaces - <<http://www.masterscommunications.com/>> DRA-series
- RIM devices - <<http://www.repeater-builder.com/products/usb-rim-lite.html>>

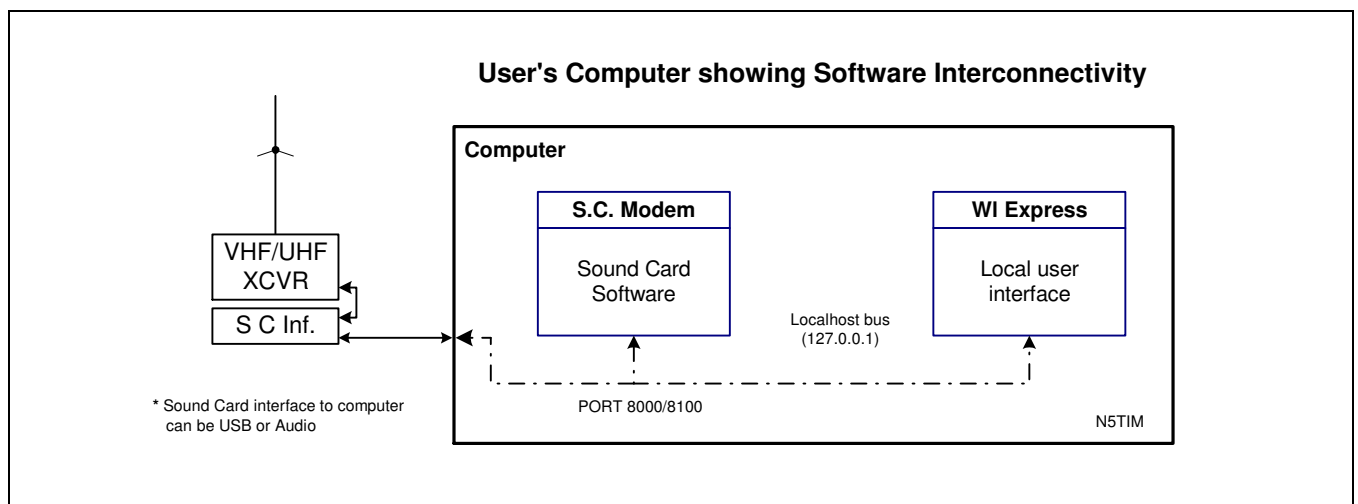


Figure 15 – Internal communications path for Sound Card type software

10. General Notes:

With the Winlink suite of software constantly changing there are bound to be inaccuracies in this document. This document's intent is to give an overview of operating configurations using Winlink software.

- The Winlink suite of program no longer supports the Microsoft XP operating system. Windows Vista through Windows 10 currently support all Winlink software features.
- To minimize Winlink software issues, install the programs in a user folder at the C:\ level.
- Check security programs and firewall setting to allow install and automatic update of Winlink programs.
- Winlink Express can be downloaded at this URL; <<http://www.winlink.org/ClientSoftware>>
- RMS Packet, RMS Relay and RMS Trimode are available at <ftp://autoupdate.winlink.org/Sysop%20Programs/>

- Setting up a user Winlink address account is automatically done when you connect to the Winlink 2000 system via radio or via a telnet session using a valid call sign with Winlink Express.
- Each RMS software program has an extensive help section to help getting started and setting up configurations and options. Searching the internet or asking a user are alternate ways of getting help with Winlink. Visit <www.winlink.org> for more info. A very good Winlink frequently asked questions document is located at; <https://winlink.org/content/winlink_faq_11_15_17_frequently_asked_questions_answers>
- Sysop software requires a 24/7/365 commitment and Winlink development team approval to activate.
- The Winlink system requires the use of password (all caps) and secure login for ALL users. This is being done to enhance the privacy and protection of the Winlink community. (now encoded)
- Details of Amateur Radio Resources can be found at;
- [https://www.qsl.net/n5tim/DOCS/Most new PCs and laptops do not have a serial port \(9 pin\) but have several USB ports. For a number of devices still requiring the serial interface a serial to USB dongle is required. Choose your dongle carefully as there have been a number of reports of clone dongles that will not work with the Winlink suite of programs. Select one that is FTDI listed and buy from a reputable dealer.](https://www.qsl.net/n5tim/DOCS/Most_new PCs and laptops do not have a serial port (9 pin) but have several USB ports. For a number of devices still requiring the serial interface a serial to USB dongle is required. Choose your dongle carefully as there have been a number of reports of clone dongles that will not work with the Winlink suite of programs. Select one that is FTDI listed and buy from a reputable dealer.)
- Additional Winlink Program information and EmComm use can be found at the following urls;
 - <<https://groups.google.com/forum/#!forum/winlink-programs-group>>
 - <https://groups.google.com/forum/#!forum/winlink_for_emcomm>

RFI:

RFI is a serious concern and can render your station inoperable. Some suggestions to minimize the problem;

- Place your external tuner, if used, as near to the antenna as possible
- Consider using shielded cables for all data and control interfaces
- Install snap-on ferrite beads on each end of all data and control cables
- Ensure your set up is well grounded

12. Odds and Ends

Paclink (Reference)

Paclink is a radio e-mail client with a built-in POP/SMTP server. It is a single or multi user client. Paclink supports telnet, VHF/UHF packet radio, and HF Pactor radio connections to WL2K servers. The user interface is with many common e-mail client programs (Microsoft Live Mail, Outlook Express and Mozilla Thunderbird). Paclink supports attachments, multiple addresses and tactical addresses. Paclink also supports use of a sound card interface via sound modem programs and external radio adapter.

Paclink is available at <<https://downloads.winlink.org/User%20Programs/>>

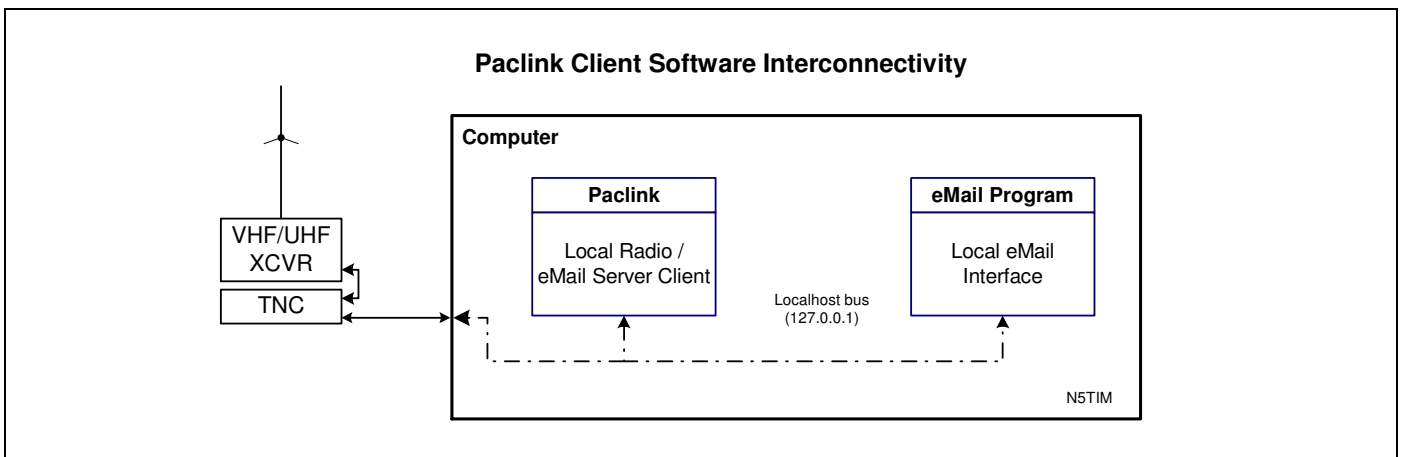


Figure 16 – Internal communications paths between Paclink and Email Client

HTML Forms

Winlink Express now contains the capability to send HTML version of a number of user and standard forms. HTML form template files are used to send formatted documents and messages between users. These small .xml data file(s) (form content) that is sent, can be opened and rendered as a received HTML form with Winlink Express. Once displayed in HTML, they can be copied, saved, printed, or sent as fully-rendered documents to served agency recipients. Message content is also sent as plain text within the body of the message for use by non HTML renderers. The forms library is now updated automatically. Most ICS forms are available as well as numerous state and other unique forms.

PiGate Emergency Email Gateway

A alternate system using the Raspberry Pi to implement an emergency contact system using the Winlink system. Detailed information can be found at <http://www.pigate.net/>. This project is developed and maintained by Mark Griffith, KDOQYN.

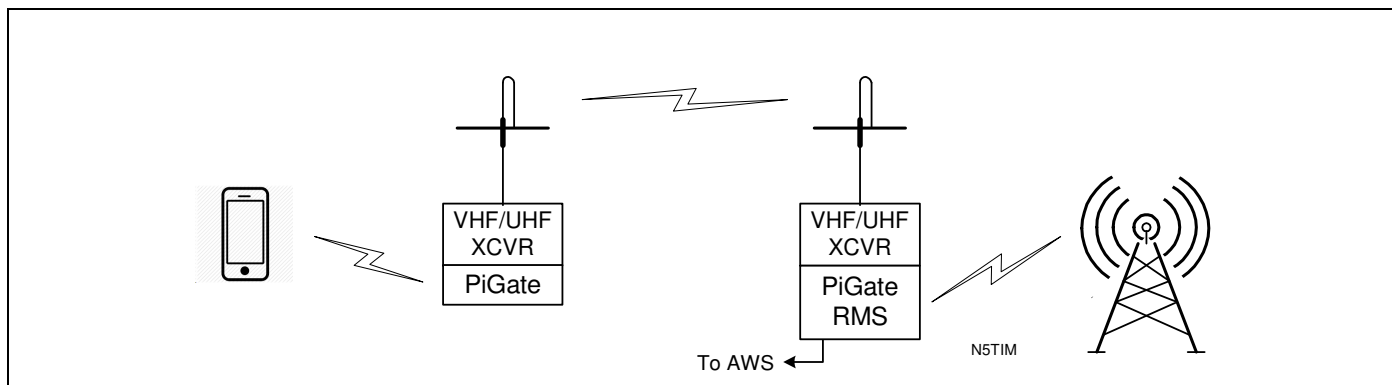


Figure 17 – Basic view of PiGate RMS configuration

Flmsg Info:

Flmsg is a tool in the NMBES software ensemble that is used to create various forms. Some agencies use this software and may want to use Winlink as the carrier. These Flmsg forms may be attached to Winlink messages and passed through the system to the recipient. The recipient must have a copy of Flmsg form to decode the attachment.

In Winlink it turns out that clicking on an flmsg attachment to a received Winlink email (and no doubt any other file that is already associated with a Windows program) invokes flmsg. Then clicking on either Edit Message or View Message on the flmsg interface opens the attachment in a browser.

As follows (flmsg does NOT need to already be running):

1. Click the paper-clip icon the message.
 2. Observe that flmsg loads.
 3. Select Edit Message or View Message as you ordinarily would for an flmsg object file.
 4. Observe that Windows Explorer opens and that the filename is in the "Filename" field at the bottom of the window.
 5. Click Windows Explorer "Open"
 6. Observe the flmsg attachment open in your browser.
 7. Proceed according to wishes re file disposition: print, edit/respond (if opened with Edit Message), etc.
- (Thanks to Jim / N6MED for this information)

Email into or out of the Winlink system

An Email from outside the Winlink system may be sent to a Winlink recipient by placing //WL2K at the beginning of the email's subject line. This allows the Winlink system to forward the email into the system and deliver it to the Winlink user. Likewise, a Winlink user may send an email to a non Winlink email address using a user's normal email address.

Winlink messaging to cell phones

The Winlink system is capable of sending messages to SMS enabled cell phones. The address becomes the 10 digit phone number @ the cell provider's internet address. (1237894560@att.net for example)

Typical Commands used in Winlink connections (Thanks to NS7C for this information)

Initial handshake:

[.....] System Identifier (SID) exchange, software version and capabilities (for example [RMS Express-1.5.36.1-B2FHM\$])

User authentication:

PQ - Account authentication query

PR - Account authentication response

FW - Forward messages for this user (call sign(s) follow)

CMS via [*Gateway Call Sign*] > Server prompt

; [*Gateway Call Sign/SSID*] DE [*Client's Call Sign*] (*Client's Grid*) Client prompt

PM Pending messages

Message transfer:

FA - Message proposal, ASCII (followed by call signs, message identification MID, and size)

FB - Message proposal, Binary (followed by call signs, message identification MID, and size)

FC - Message proposal, Encapsulated (followed by message type, identification, and size)

F> - Proposal acceptance or rejection (Y or N for each message proposed)

Session completion:

FF - Requestor has no further messages

FQ - Responder has no further messages, disconnect

If the session ends without the FF->FQ handshake, it was not successful and should be retried (possible time-out disconnect). In Winlink FC is the most used (encapsulated message) proposal.

An example of a simple sound card interface

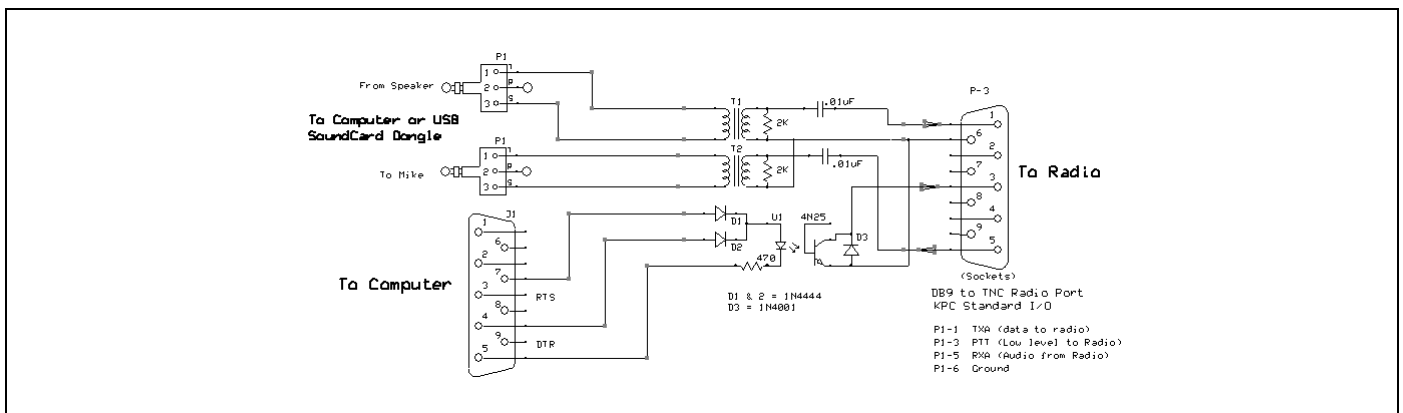


Figure 18 – Minimalist Software Node Controller

Information used in developing this document came from many sources, Internet, other documents and field experience. Thanks go out to those who developed Winlink software, continue to support and use Winlink programs for amateur radio digital communications and those who reviewed drafts.