

# WHAT VARIOUS WINLINK PROGRAMS CAN DO FOR EMERGENCY COMMUNICATIONS

Gordon Gibby KX4Z  
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I confess that—despite being a sysop who runs not just one but THREE winlink radio servers!--- I find the WINLINK suite of software solutions somewhat confusing and intimidating. If you aren't on a boat, or in the middle of a forest, or in the throes of an emergency, you don't really *need* their radio-based email system in your normal life, so you are unlikely to gain expertise at it. Unless you are a person who prepares to serve others. For my experience suggest this is a worthy addition to the bag of tricks of an emergency communicator, offering high speed (*far* faster than copied voice), accuracy, no need for schedules and net controls; and no need even for two stations to achieve simultaneous operation on a certain frequency, for emergency messages to get from station A to station B.

WINLINK email is roughly ten times faster than copied voice communications. For larger files, the advantage can be more than 50 times faster...

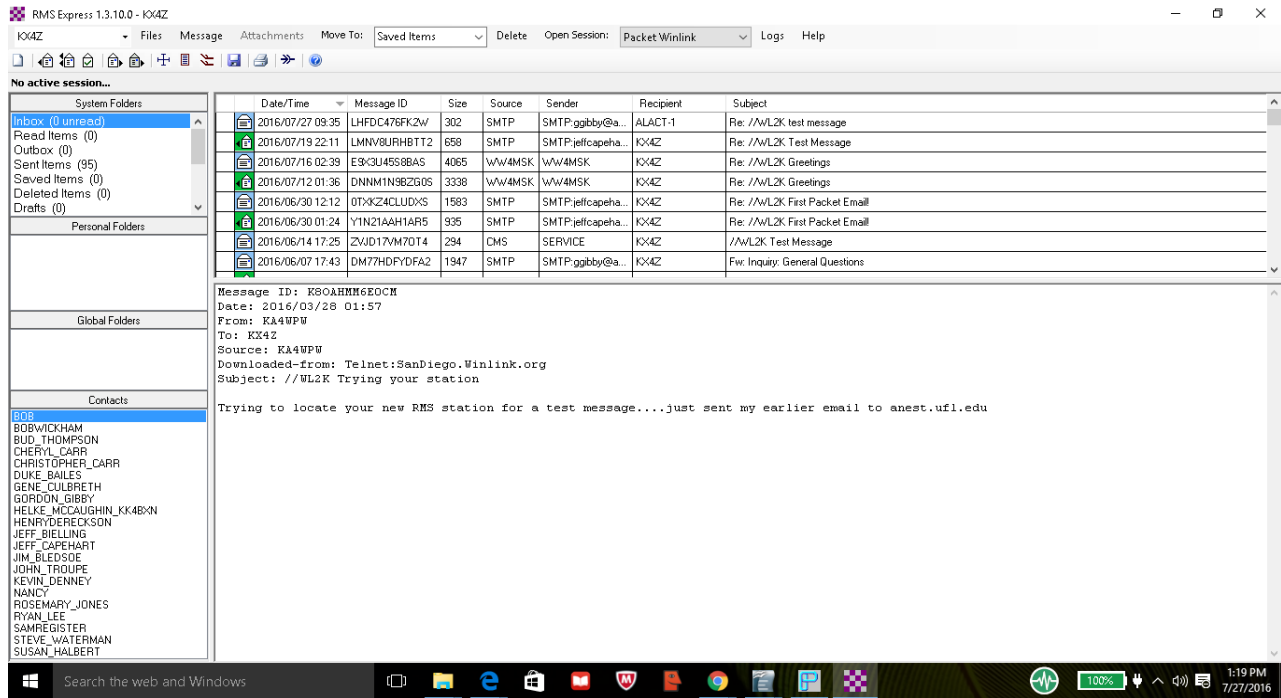
Perhaps a table of the available WINLINK software packages, listing what they can do, would help. Followed by a somewhat more in-depth explanation of possible emergency communications features of the more likely-used ones. In a separate paper, **STAGES OF WINLINK EXPERIENCE FOR EMERGENCY COMMUNICATIONS**, I will present a learn-as-you-go set of steps that the average ham or ARES group can take to progress from the easiest entry-level Emergency Communications using WINLINK, all the way to a full-featured “At-Your-Desk” System that provides fairly advanced features to an EOC or Shelter.

## CLIENT-SIDE SOFTWARE PACKAGES [1]

:	WINLINK EXPRESS	PACLINK
Note:	Previous name: RMS EXPRESS	(This is NOT Packlink AGW)
Principal function	Email client application that allows you to write, send, receive, reply, forward – all the typical email features, including attachments – over amateur radio, both HF and VHF/UHF	A “middle-man” software that can connect to the outside world by any of several available methods including (1) any working Internet feed, (2) PACKET ham radio to a WINLINK server, (3) PACTOR ham radio to a WINLINK server – and provide POP3/SMTP email send/receive services over a LAN or WIFI that appears the same to users even tho the software is

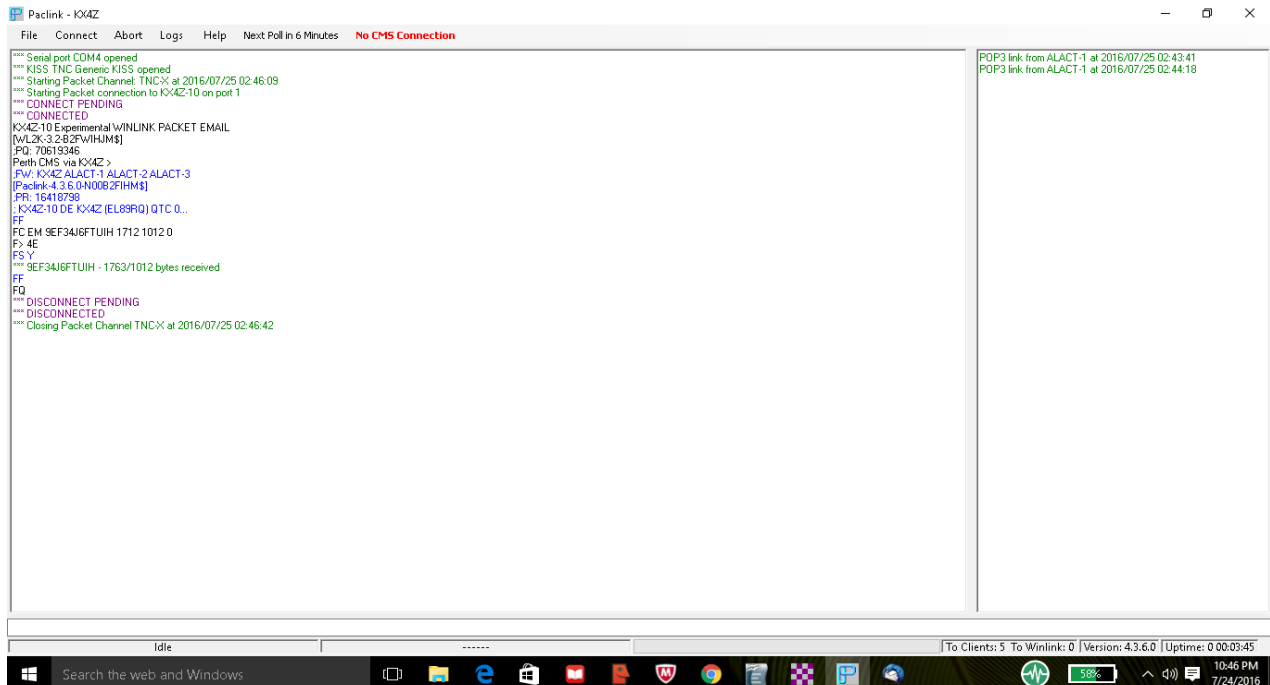
		<p>automatically switching the feed as the emergency unfolds.</p> <p>Possible usage would be to keep your emergency leadership team still using their own computers to do email in a disaster rather than passing you scraps of paper.</p>
Computer operating system:	Most modern forms of WINDOWS back to XP	Most modern forms of WINDOWS back to XP
Alternatives?	There are a few other software packages that can also work with the WINLINK system, some of which are used in significant numbers by boaters.	
Cost	FREE	FREE
Bands	HF / VHF / UHF	Typically VHF / UHF but possibly HF
Modes of data transfer	WINMOR (using Signalink or similar) and PACTOR (using proprietary SCS modems) and ROBUST PACKET (not as commonly)	<p>PACKET – using either hardware- or software-based TNC</p> <p>PACTOR – using proprietary SCS Modem</p> <p>TELNET – over existing working Internet connection</p>
Users	<b>Multi-user.</b> Drop down box allows you to pick YOUR callsign and gain access to your email account on WINLINK.ORG	As an “interface software” this allows one ham radio operator to provide MULTIPLE “tactical” email accounts that function fully like real email addresses, but send and receive email under the ham radio operator's callsign access to the WINLINK system – basically 3 <sup>rd</sup> party traffic automated.

Here's a screen shot of each to help you more easily see what they do:



### WINLINK EXPRESS – an email client over radio

**PACLINK – having just made a PACKET connection to retrieve email (left panel) and being periodically polled by POP3 email clients (right panel)**



**WINLINK EXPRESS** is purpose-built as an email client for the WINLINK system—but can also use the Internet when it is working. Winlink Express includes the ability to connect to sound-card based digital modes, as well as SCS PACTOR modems. For emergency communications, it has the very helpful feature of being able to integrate with a web browser to transmit and receive FORMS, including popular ICS forms. It sends forms in a concise format that is clearly readable even as text, but on any station that has uploaded the necessary templates, received forms are displayed exactly as official forms. Very impressive feature for served agencies.

Before we go farther, we need to discuss two classes of communications support:

### **AT-YOUR-STATION versus AT-THEIR-COMPUTER Emergency Communications**

These are two very different ways to provide backup emergency communications support to leaders (& citizens) who need your help during disasters. *At-Your-Station* is the traditional ham way of providing communications. Someone—possibly the ham—writes down (if possible) the message to be communicated (except brief tactical messages) or if a digital station, types it into the ham-computer. Next the message is spoken, or transmitted from your ham station. Receiving works the same process in reverse. Labor intensive, error prone.

*At-Your-Station* does provide “full service” but at a significant cost to both parties of this third-party communication. You, the ham, have to do multiple tasks that could be eliminated. You may have to write the message down or type it in, and then you may have to speak it laboriously as well. The disaster services leader, whom you are serving, experiences added work as well – they are probably more comfortable entering their own thoughts on their own computer, at their own desk – but now they have to scribble it out or come to you in order to get anything accomplished. Lose-lose all around, but it is SIMPLE and it WORKS.

**At-Their-Computer** is really a groundbreaking way to provide emergency communications, but it leverages computer services that were common even 2 decades ago – standard POP3/SMTP local-area-net email server applications. By using an email client that connects in this way, the emergency services leader (or a member of the public at a shelter on a health&welfare computer) can send (& receive) their own email at their own desk, removed from the bustle of the ham station. When they hit “send” the message transfers to the ham station's “in-queue” via the POP3/SMTP server application. [This is necessary because the emergency services leader (or member of the public) is not licensed. They can't send their own ham messages!] Instead, well-constructed WINLINK software causes their emails to “ride along” (for both send and retrieve functions) under the wings of your callsign WINLINK account.

Note that POP3/SMTP servers are a mature technology. Anyone who was involved in networking or modems ten years ago may be familiar with them, and they are still quite workable. Modern WIFI networks offer end-to-end encryption, so security (only within your building – there isn't real security on ham transmissions) can be augmented. Free email client applications abound. I have used Mozilla Thunderbird, and Microsoft Outlook offers this as well. Next I'm going to try a tiny app named Popcorn.

There is more than one way to provide At-Their-Computer emergency email services. It simply has to be over a local area net (e.g., WIFI) because the users aren't necessarily amateur operators. POP3/SMTP services can be provided at two different levels of the WINLINK system:

Where POP3/SMTP services available	Software that accomplishes this
<b>Client ham radio station level</b> – literally any ham in the world who can connect to WINLINK either by packet or PACTOR	<b>PACLINK</b> provides the connection to WINLINK and the email server services on a connected LAN —wifi or 10BaseT Ethernet.
WINLINK RMS <b>Server station level</b> (must be co-located where services provided)	<b>RMS_RELAY</b> has provision for providing its on POP3/SMTP server to local area net computers

**PACLINK** uses well-established POP3/SMTP protocols with the unique ability to allow one communications volunteer, stationed at a shelter or agency, to provide At-Your-Desk type multiple individual email accounts (all under their own call sign) to officials or the public. These are *real* email addresses (at WINLINK.ORG) such as [TACTFIRE-1@WINLINK.ORG](mailto:TACTFIRE-1@WINLINK.ORG) , and yet have the incoming email routed right back to the computer of the correct official. This has enormous ability to offload unnecessary busy work from the communications volunteer, while giving individual email access on their familiar laptop, to crucial officials. Yes, they may have to use a slightly different email application – *but they still have their own email!*

Note: WINLINK EXPRESS has a limited subset of this capability. Callsign users can define additional tactical addresses which are then linked to their account in the same way PACLINK does it. Persons with access to that computer can the send email from these “alter-identities.” The PACKET automated handshakes notify the packet server software of their willingness to additionally pick up email addressed to their alter-identities – but WINLINK EXPRESS simply places the alter-identity email back into their normal callsign in-box. *It is not possible to create a completely separate non-ham user within WINLINK EXPRESS.* All of of the multiple users (one at a time) who use WINLINK EXPRESS must be valid ham radio callsigns. PACLINK provides superiour functionality (over a LAN) and allows for tactical (alter-identities) users to use their own computers, via POP3/SMTP.

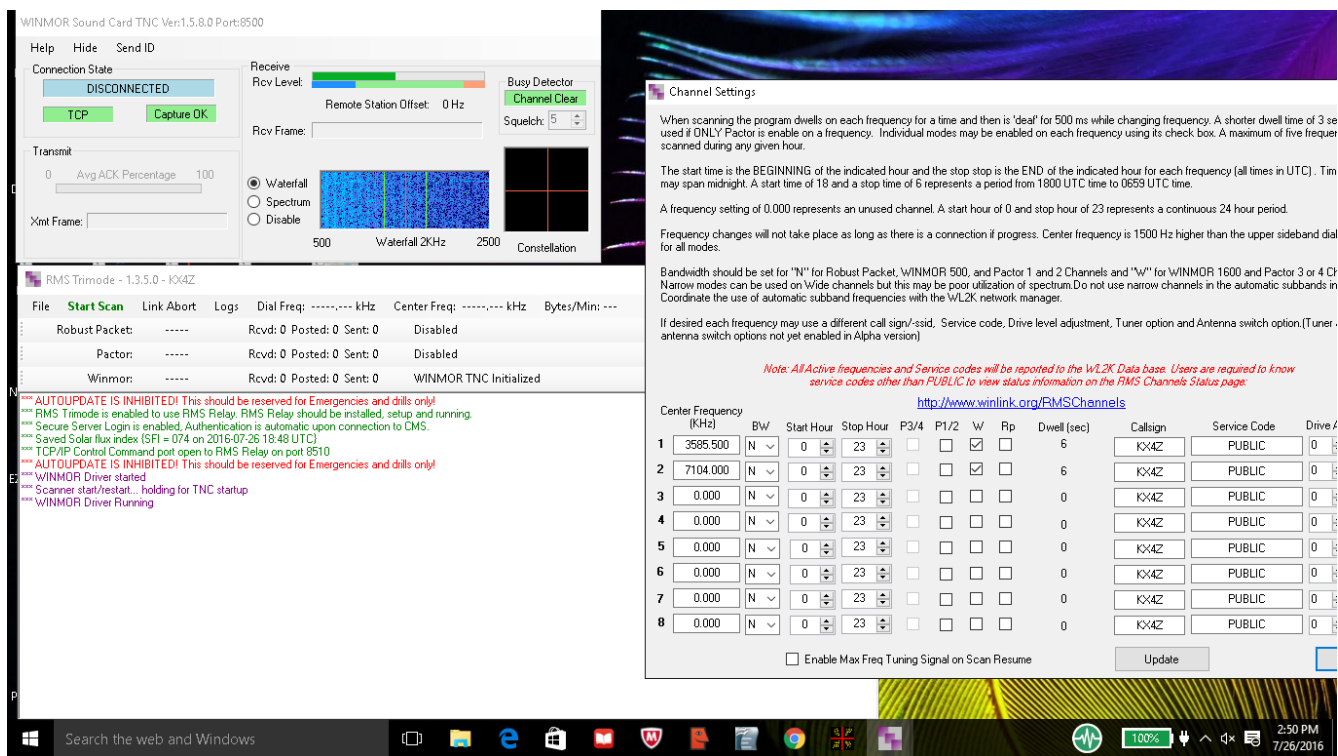
## SERVER-SIDE SOFTWARE PACKAGES

On the server-side, WINLINK provides three different server software packages to operate the RMS (Radio Message Server) stations. These can be combined in some unusual ways. The following table attempts to untangle their features. One must be formally approved for your server to tap into the

mirrored and secured Central Message Servers, but the process isn't difficult at all and they are always looking for faithful new systems operators. [2] Winlink servers are expected to have backup electrical power and to function 24/7/365 days a year.

	<b>RMS PACKET</b>	<b>RMS TRIMODE</b>	<b>RMS RELAY</b>
Overall function	<p>One of the simplest packages, RMS PACKET can provide packet-based email server functions when connected directly to the Internet (WIFI or ethernet), or via a socket connection (on the same or other computer) to RMS RELAY</p>	<p>Aimed at the HF bands (but also usable on VHF) RMS TRIMODE provides soundcard based (WINMOR) protocol; PACTOR access; and ROBUST PACKET access to email services. (3 modes, get it?)</p> <p>TRIMODE can electronically control many ham transceivers and step them through multiple bands, frequencies and protocols, in a repetitive fashion, unending. A typical TRIMODE station will provide access on 3-5 frequencies scattered throughout the HF bands. The FCC limits the highest speeds to certain slices of the bands.</p> <p>TRIMODE can connect direct to the Internet (via WIFI or ethernet) or can connect via RMS RELAY.</p>	<p>RMS RELAY gives the server station the ability to <b>store and forward</b> email messages itself, rather than only being able to send and receive them from the Central Message Servers.</p> <p>RMS RELAY implements a fully independent, radio-forwarding-based email system which can get your email to&amp;from a more distant server that still has internet access --- or, using "Message Pickup Stations" it can continue to function even if the <i>entire</i> Internet disappeared.</p> <p>RMS RELAY computes best paths, and uses RMS TRIMODE to switch frequencies and find available servers and move mail throughout the system, acting like an automated NTS net.</p> <p>RMS RELAY keeps a list of where clients expect to find their email, should the entire internet disappear.</p>

Computer Operating System	Windows of any form back to VISTA level	Windows of any form back to VISTA	WINDOWS of any form, back to VISTA
Cost	Free	Free	Free
Digital hardware supported	A large selection of TNC's, including KISS and TNC-X as well as PACTOR (SCS) modems	Signalink or similar (WINMOR); PACTOR (SCS) modems; A large selection of packet TNC's including KISS and TNC-X	Works through the other two software packages to reach the radio.



*Screen shot of RMS TRIMODE, with the WINMOR TNS dialog displayed in the upper left hand corner, TRIMODE's normal monitor screen at the lower left, and the "Channel Settings" setup dialog displayed at the right.*

**RMS PACKET** doesn't have to change any radio frequencies, nor make any independent transmissions, so its software package is rather plain-vanilla. It can be integrated with RMS\_RELAY (allowing it to push mail out even without Internet), but most systems probably just allow it to forward and receive email directly over the Internet.

**RMS TRIMODE** has the most interesting screen presence (see accompanying screen shot) because not

only can it include the traditional “waterfall” of the WINMOR software-based digital protocol, it also has the ability to step a HF transceiver through many bands, frequencies and modes. In the accompanying photo I display the “Channel Settings” dialog. Understanding these settings takes much of the mystery out of the process of connecting to a WINLINK server. For each successive frequency, one selects which digital MODES will be scanned for. More modes equals more time required on that frequency. In use, the transceiver may spend 3-6 or more seconds on each frequency before moving to the next one. If one frequency on each of five bands is being monitored, the total “cycle” to go around the entire group can reach 20-30 seconds. If your connect request—which must have the correct station call sign to be answered – goes out on the 40 meter band when the station just finished that monitoring and has four bands to check before returning – you might miss getting the connection that time. Just be patient and give it another try. The reason RMS servers usually set their stations to check multiple bands is to accommodate all sorts of band conditions – and users who are at all sorts of distances as well, thus requiring different frequencies to escape the Maximum Usable Frequency limitations for each geometry required to get from their boat (or house) to the server.

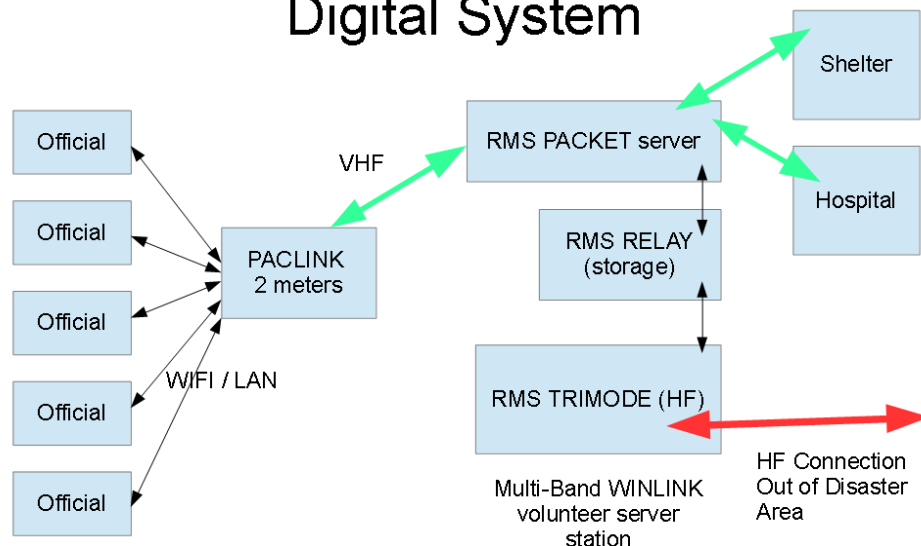
An RMS TRIMODE running by itself can receive and dispense email, connecting distant radio stations to Central Message Servers via the Internet. RMS PACKET does the same thing, basically, but for ONE frequency, and usually for PACKET. There are many RMS PACKET servers scattered about the nation.

## Emergency Communications Digital System

**Now let's consider the most fascinating possibility for ham radio emergency communications service:**

**Connect It All Together:** One or more RMS TRIMODE apps can be connected to RMS RELAY instead of directly to the Internet. This adds the ability for local storage of email – and automated RF

## Emergency Communications Digital System





forwarding of that email – making the system an Internet-independent email station, quite a useful system for Emergency Communications. However, you can also connect an RMS PACKET server to the same RMS Relay – and this will give the VHF Packet users the interesting ability to have their distant-bound email RF forwarded by an HF transceiver automatically to distant still-connected-to-the-Internet RMS servers, should local Internet be down and marginal! Now you have the basis for a VHF catchment area of email services, that is provided long-distance access over HF radio through a single server station.<sup>1</sup>

If you add a PACLINK client app running on the laptop of the 2 meter ham volunteer, at an EOC or Red Cross or Shelter for example, you now have a multi-station, multi-user email system where officials can type and receive their own emails on their own laptops – and all funneling through volunteer ham radio operators both on VHF/UHF and on HF. Slower than normal Internet of course – but **it works when nothing else does** and the operator no longer has to be a typist or mail distribution clerk.

**LOCAL EMAIL** How about mail that just needs to be exchanged between local shelters and local officials all of whom are within the disaster area? There is really no need for that email to go all the way out over HF to a Central Message Server (CMS)--and it doesn't have to. WINLINK volunteer developers have worked this out – there is a setting in RMS RELAY configuration that allows it to hold email for local (e.g, 2 meter packet) users for any chosen time – thus the RMS RELAY program by itself acts like a complete email local server for inside-the-county communications. [3] RMS RELAY defines as “local” any callsigns or tactical accounts which check in (or are associated with a callsign account which checks in) over PACKET or TELNET.

There are possibly additional methods to keep local traffic “local” as well, such as having everyone set that particular RMS Server as their only MPS (message pickup station) – thus causing all the email sent by others to them to be held there for them. I have not tested that technique.

## DISCLAIMERS

An overview document such as this cannot hope to document for you every one of the settings & configurations on the multiple setup screens of these various software. In a later document I may be able to document many of the settings, but expertise gained from experience will also guide you, as these packages are always slowly changing and improving.

WINLINK software, while very impressive, is not professionally written commercial software. Just like much of the advances in ham radio, it is *volunteer-driven*. You are not likely to get the same level of “customer service” that you might expect from a for-profit company who charged you \$10,000 for their software package. WINLINK development team members periodically put out updates and improvements to their software, which may take you by surprise. Your Windows computer itself may update itself (thanks to Microsoft) in ways that were not expected. There isn't a completely up-to-date, indexed and proof-read set of complete instructions anywhere to the entire software suite. While there are extensive – truly extensive – log files constantly generated by every piece of WINLINK software.... you may have trouble getting anyone even to decipher them for you! You should become thoroughly familiar with the software if you are going to use it. You should use it regularly and keep abreast of its most recent upgrades (which are automatic if you don't stop them). If you opt to become

a systems operator for an RMS server station, you'll join a Yahoo group where questions and problems are batted about and you can get help, and help other hams using this system. During an ACTUAL emergency, you may want to disable upgrades so that nothing unexpectedly changes, in the middle! You may want all your team members to run the same version of WINLINK EXPRESS. You may want to have backup installation software readily available on thumb drives at key locations.

These are the sorts of things that are necessary to have a well oiled and constantly available system of any type, whether it is a *generator* that you want to work during a power outage, or a *radio-based email system* that you want to be ready for prime time, when it is needed. Is Winlink simple? No. Will it do EVERYTHING needed for emergency communications during a disaster? No. Neither an automobile nor a modern solid state ham radio transceiver can answer “yes” to both those questions, but people elect to learn how to operate them, anyway!

## REFERENCES:

- [1] Client side software: <http://www.winlink.org/ClientSoftware>
- [2] Becoming a WINLINK sysop:  
[http://www.winlink.org/content/join\\_gateway\\_sysop\\_team\\_sysop\\_guidelines](http://www.winlink.org/content/join_gateway_sysop_team_sysop_guidelines)
- [3] <http://n4ser.org/wp-content/uploads/2016/03/RMS-Packet-with-RMS-Relay-Setup.pdf>

## Additional information

2014 set of instructions to set up RMS RELAY & a radio-only station  
[http://www.philsherrod.com/Winlink/Setting\\_up\\_Winlink\\_hybrid\\_network.pdf](http://www.philsherrod.com/Winlink/Setting_up_Winlink_hybrid_network.pdf)

RMS RELAY revision history  
<http://www.oe3xec.at/wp/wp-content/uploads/2015/02/RMS-Relay-Revision-History.txt>

An example of a Canadian Province that extensively uses WINLINK & other technologies for emergency communications: <http://crercc.com/>

- Extensive use of nodes – with ability to reach WINLINK gateways
- Mini-BBS's
- 3- frequency PACKET networking
- Use of Node Stacks that allow cross band distant packet connections
- RMS Relay used to hub messages locally
- Multiple packet paths to each mutual radio partner
- Multiple WINLINK RMS PACKET gateways on all 3 frequencies (8 VHF, 4 UHF)
- 60% of EOC's have HF PACTOR ability
- WINLINK RMS TRIMODE on HF frequencies – seven stations currently in one province.



- i If RMS RELAY experiences loss of Internet Access for longer than a set period of time, it takes note of local Packet- and telnet- (ie., over direct local area network) users, and generates connections to more distant HF RMS servers both to send out any email that needs to be sent, and also to establish that it will be picking up email for those known users (Packet or Telnet users). On the first outbound connection, it send out all pending email and notifies of the persons it is serving; on the second connection it will begin collecting email to hold locally for those users. The delay between successive automated polling for inbound email is configurable and typically 30-60 minutes. There is also considerable control over the choice of stations to which connections will be attempted. These can be set to improve performance if certain servers are more consistent.