

## Winlink 2000 for ARES: Frequently Asked Questions

### 1. *Why the big push for digital communications, anyway? What's wrong with the way it is now?*

Written documents impose their own kind of discipline. They are accurate, may contain graphic pictures or complex drawings, and they may be stored as a permanent record for whatever purpose desirable. The question is not so much why digital, but why the need to complement voice communications, and what format and medium should be used.

The solution to written digital communications becomes obvious when we consider that 99.9 percent of our emergency Communication efforts are in behalf of the agencies we serve. When do you think the last time one of these agencies sent an email? Let's face it, the world has adopted SMTP Internet email and in order not to appear antiquated when assisting our served agencies, we should not disrupt their pattern by attempting to use any other medium. Rather, we should efficiently and transparently provide them with what they use daily, SMTP email on their own computers, in their own normal operating places with their own familiar email programs.

Winlink 2000 is not looked upon as a complement to the other forms of communications now employed by

ARES and NTS. It is not meant to be a replacement for such long standing and proven services.

2. *How would Winlink 2000 deployment fit into the ARRL Field Services organization?*

Winlink 2000 is proving to be an outstanding addition to the capabilities of ARRL Field Services, providing nearly real-time radio email service for all served agencies and the public. It can work in harmony with the resources of the existing manually operated NTS and the NTSD digital services to cover all parts of our country and beyond, with ARES providing the connections to the served agencies within the Sections. Winlink 2000 can greatly enhance the operation of all these combined resources, and is robust in speed, interoperability, ease of use and surviving loss of infrastructure. It can provide those we serve with what they need.

3. *Who owns the Winlink software and what happens if the developers have health issues, lose interest or otherwise become unavailable?*

Its four developers, Vic Poor, W5SMM, Hans Kessler N8PGR, Steve Waterman K4CJX, and Rick Muething KN6KB own the Winlink 2000 source code. To date, the Winlink 2000 system has taken approximately 10 man-years of development effort,

and the developers do not intend to release it to the public domain. However, the Winlink Development Team understands that deployment of the Winlink 2000 system on a national level with ARRL sponsorship requires assurance that the software has been properly documented and that the source code will be made available to whoever could take over maintenance should it be required. The Winlink 2000 software is not intended for any other purpose other than for the ARRL ARES/NTSD without the prior written consent of the developers.

4. *When directly connected to the e-mail system of a served agency, how can we ensure that the message traffic complies with Part 97 rules regarding message content?*

Winlink 2000 employs multiple mechanisms to insure compliance with Part 97 content rules, however, remember that when Sub-Part E is in effect for any real emergency, it also applies. Regardless, the following steps are taken to insure Part 97 applies:

- Virus Email screening on all inbound and outbound messages. To date, no infected file from a virus has ever successfully entered the Winlink 2000 system.

- Inbound E-mail is allowed only from trusted senders via a globally maintained “acceptance list” <http://winlink.org/accept>. Trusted senders are those that have received mail from Winlink 2000 radio users, or who are otherwise specifically placed on a trusted senders list. Normally, Internet users may manually temporarily register their email address from the web for a period of only 5 days, or until a reply has been sent by a Winlink user. Should the Winlink user reply within the 5-day period or initiate the communications, the address remains valid for 6 months from the date of the last reply.

For ARES, this feature may be easily turned off or on, depending on the specific situation. The acceptance list methodology is employed by many major ISPs to keep unwanted email away from the Winlink 2000 user.

- Winlink 2000 maintains a “do not accept” list that can block *any* specific Email address or radio user. Each and every radio users has a “Permissions” status that allow operations on only those bands that the license dictates.
- Internet and Radio users are continually advised and educated regarding content and traffic limitations of the system to comply with Part 97.

As a matter of policy, we also include those non-US Amateurs users who have no USA FCC affiliation as well as Amateurs in International waters.

For ARES use, it would also become a responsibility of the serving ARES community to educate those individuals in served agencies who have access to the Winlink 2000 system during normal periods to have some understanding of what is allowable traffic.

- Winlink 2000 sysops and administrators do routine message content review of messages that go over the Amateur Radio spectrum. Any content found to be illegal or questionable is removed and the sender given one warning. Repeat offenders are locked out of the system. The responsibility for monitoring content for ARES use would fall on the control operator of the ARES serving stations just as it does with any other Amateur operation.
- Winlink 2000 utilizes real-time network monitoring for its servers and participating stations <http://winlink.org/status>. As the network delves into more of an emergency management mode, password security for the network status may be easily employed.

Winlink 2000 has been operating since 1999 under close scrutiny and without incident.

5. How long does it take to become a subscriber?  
Can the system be positioned so that it's available  
when an agency needs it even though the agency has  
not done any deployment work or training in advance  
of the onset of an emergency?

The setup and operation of the Winlink 2000 system is straightforward and radio users are automatically registered upon an RF connection to the Winlink 2000 system. However, like any system it requires training of operators to set up and become familiar with the various software programs and operational modes. In addition specific “Internet bridging” mechanisms being discussed require the proper setup at each end of the link to insure reliable operation in the case of loss of Internet connectivity.

If the system is to operate reliably during an emergency it must be operated, tested and maintained continually, and users and operators of the system must be familiar with the programs and techniques used to send mail via RF radio/internet links through the Winlink 2000 system. This is the ‘added value’ that radio amateurs bring to the table.

During an emergency, the end-user in a served agency does not need special training other than perhaps some information regarding message content. *With the Winlink 2000 Paclink module placed on a served agency computer, those not familiar with ham radio or digital communications may transparently use the Winlink 2000 system with their own email programs on their own computers in their own offices if they are set up properly and given information about speed of delivery and attached file limits.* The Paclink module was specifically designed for this purpose. The only difference to an end-user in a served agency is that the emergency Communication email account using Winlink 2000 may be slower than a normal email connection since it will be over Packet Radio rather than their normal connected service.

#### 6. Are binary attachments legal?

The Winlink 2000 “B2F” protocol has no encryption and may use standard publicly documented modes such as AX.25 Packet or Pactor. Binary compression and file transmission have been used extensively by radio BBS systems for many years, and been ruled permissible since they do not violate the encryption rules. Actually, there are no differences in protocols between attachment email and non-attachment email.

*End part one*

*Start part two*

7. Does Winlink 2000 contain any redundancy measures? What if the Internet fails in the immediate area? How robust is Winlink 2000? What is its experience thus far as a reliable system?

Winlink 2000 is a network system that integrates or bridges RF radio and Internet connectivity. Over the Internet, the system behaves like any other Internet communications system and can handle any type of Internet connectivity such as wireless routing or satellite communications, cell phone, etc.

In order to send and receive seamless, end-to-end email to single or multiple recipients, with single or multiple copies, and with multiple binary or text-based attachments, Winlink 2000 utilizes the binary “B2F” protocol. There is a provision for utilization of much more limited protocols, but with much less proficiency, security and reliability. The B2F protocol then may be transferred via any Internet connectivity methodology. Pactor, Packet, etc., may all be wrapped around the B2F protocol

The B2F protocol also is adaptable to higher speed radio modes such as AX.25 Packet, the Pactor modes, and other such complex higher speed modes. On HF,

the Pactor 2 mode may be employed to provide up to 800 Bits per second, the Pactor 3 mode up to 3600 BPS while on VHF/UHF, from 1200 to 9600 baud or greater Packet may be used.

With nearly 44 percent compression and excellent error correction, the B2F protocol is a superb means of linking the radio user to the Internet. Nothing has yet been discovered that is more robust, and should it be found, it will be used. Likewise, should a more robust or efficient mode be discovered to wrap around the B2F protocol, we will certainly be using it.

Winlink 2000 uses a “Star network” topology with three central redundant servers, called “CMBOs” or “Central Mailbox Offices.” There is an Eastern U.S. CMBO and for redundancy, there is a West Coast CMBO and another in the central US. Each is located in a secure site with backup power. In addition, the network nodes, or participating Winlink 2000 network radio stations, are called “PMBOs” or “Participating Mailbox Offices.” Users, then communicate with the PMBOs either directly or through other modules, depending on the scenario.

There are 85 of these “public” PMBOs, most of which is located within the United States with the rest located Worldwide (<http://winlink.org/stations.htm>.)

Many of the 85 PMBOs utilize multiple stations that allow simultaneous multiple band operation. All those located within the United States have permanent Internet connectivity. The CMBOs and PMBOs all have real-time network monitoring to determine their availability and when there is a problem. (<http://winlink.org/status>.) For ARES, this monitoring will most likely be password protected. The exact number of ARES PMBO's is not known at this writing; however we do have two in Arkansas and several in Texas.

Each PMBO has HF connectivity ability that can cover several frequencies on several bands via a scanning module that controls the radio. Each PMBO has an ability to integrate into a VHF/UHF Packet network.

Each PMBO has an ability to be a Telnet Server that allows local or distant Telpac nodes, as well as Paclink and Airmail modules to send and receive messages over the Internet instead of the radio. Not all PMBOs use all these abilities, but most participate so that the network is optimal for the 18,000 plus users who depend on it daily for their communications needs.

There are a host of other feature sets and services just too lengthy to mention here, but these services and

abilities may be viewed on <http://winlink.org/Emergency.htm>. Just click on either the PowerPoint or PDF version of the Sample ARES-RACES presentation and read about the various capabilities of the current system.

8. *Is the VHF/UHF Packet portion of the Winlink 2000 system compatible with other existing packet networks?*

This depends on what is being used. As a general rule, as with any vertically layered network topology, the feature set of the entire system is only as strong as the weakest component within the network. If an existing digi is employed, it will most likely work, but it will cut the throughput in half. If a switch is used, the switch may come in at one speed and leave at another speed depending on the type of switch and its configuration. Remember, we are serving agencies that do not particularly care to move away from their standard and long time adopted SMTP mail.

9. *What other features are available besides email?*

Catalog: Winlink 2000 has a Global catalog list that contains over 700 weather products and a large “how to” help section. There is also a provision in each PMBO for local information such that is particular to each participating station. For ARES, such bulletins

would and should contain operational or procedural information for the ARES teams as well as required information for the served agencies. This information may be text-based or contain binary file attached information.

*Position Reporting:* Winlink 2000 contains several Graphic means by which users may be tracked if so desirable. There are three graphic methods, including APRS and one email request method. In addition, each Airmail client has the option of turning on a manual or automatic tracking system, which works in conjunction with a small portable GPS that is interfaced into Airmail program. Manual input is a lesser attractive option.

*Flexible message routing is employed.* There are two classes of users, Fixed and Mobile. A user set to a “Fixed” status is routed to a single participating station (PMBO.) Therefore, all messages go to that PMBO. However, a fixed user may place messages on the system from any PMBO.

A Mobile user has the ability to check into any PMBO. When the user checks into a specific PMBO, messages will go to that specific PMBO for a duration of 90 days from the date of the last check-in. If a user checks into *a* number of PMBOs, messages will go to those PMBOs under the same conditions.

Each PMBO is transparent to other PMBOs in the system, so that the user may pick up part of the messages on one PMBO and when they check back in on another PMBO, only those remaining messages will be pending. This process is also true for Global Catalog items and Position Requests.

*10. What is the future plans for Winlink 2000?*

Plans were recently completed when the Winlink Development Team enhanced both the CMBO and the PMBO in order to provide more redundancy and less Internet dependency. Specifically, replacing the current CMBO servers with redundant synchronized servers called “CMS” or Central Message Server.” There are now multiple CMSs, which are distributed in such a way that they will not be within the same geographical region. In addition the current PMBO has been replaced by the “RMS” or Remote Message Server” and it is able to route randomly to any one of the CMSs. In addition, the new RMS is able to alternate route over HF radio when the Internet fails.

In sum, The Winlink Development Team is has developed an existing, reliable, redundant digital communications system for the mobile or fixed user with or without Internet access. It currently hosts over 18,000 HF radio users and over 56,000 Internet recipients who pass over 150,000 messages using

over 260,000 radio minutes through the system monthly. The average size of each message is approximately 5600 bytes and the average total connect time throughput is approximately 1.8 minutes. The average time for a message to be sent from an Internet recipient to a PMBO for pickup is approximately 1.4 minutes. This is not anywhere near capacity since the system resources are barely being used. In addition, these numbers do not include the ARES uses of Telpac over Telnet or the WEB browser access to the system.

The Winlink Development team has recently shifted gears and is now enhancing the system to be more easily employed as an emergency management tool for community served agencies, with an ability to link anyone, anywhere, locally, regionally, nationwide or Worldwide. Remember, this is a proven, working, operational system and does this currently, many, many times daily, every day for its current users, just about everywhere in the World.