

Background

Digital communication is a very useful means of messaging when combined with voice communications.

Digital communications has the ability to:

- Provide error free messages
- Provide messages in a familiar email form, with similar advantages
- Use attachments to messages, similar to normal email
- Provide a medium level of confidentiality (It is not encrypted, but is transmitted in a form that is not easy to read)

As such, digital messaging is highly suited for highly detailed or semi confidential messages and where a number of copies need to be sent to different end users.

It is NOT appropriate for urgent and critical messages.

The Harris County Office of Emergency Management and Homeland Security has requested that ARES provide digital communications coverage throughout the county.

Objectives

Top Objective

To provide digital messaging to meet the needs of the served agencies

Enabling Objectives

1. To increase the number of amateur radio operators using digital messaging:
 - The equipment used for digital messaging should use standard hardware and software
 - The system should be easy to commission and use
 - Practical training workshops should be provided
 - The systems should be demonstrated to clubs and ham gatherings
2. To gain acceptance of the served agencies:
 - Digital messaging should be used in drills and exercises
 - Demonstrations and presentations should be provided to local agencies, including EOCs, VOADs (Volunteer Organizations Active in Disasters), relief and aid organizations.

Concept of Operations

Harris County ARES has adopted the Winlink system for digital messaging. This includes:

- A VHF/UHF network for local messaging
- An HF network to extend the range that is provided by the VHF network
- Use of the internet if appropriate and when available

VHF/UHF Network

The primary VHF network is based on a 1200bps system. In this system are the following components:

- Telpac stations to transfer messages to and from the internet. They can be connected to the internet by any provider (cable, DSL, satellite, wireless link)
- Digipeaters and KA nodes to repeat messages and extend the normal range
- Individual stations, either fixed or portable. The main software used by these stations will be either Airmail packet or Paclink (both available as free downloads)

The frequencies of operation for this network in the County and close by are:

Area of operation	Frequency	Speed
South of I-10	145.050	1200 bps
North of I-10	145.070	1200 bps
Western part of County	145.090	1200 bps
UHF	446.150	1200 bps
North of the County	145.030	1200 bps
East of the County	145.010	1200 bps

These boundaries are not exact and overlap of coverage is encouraged.

The UHF frequency is available for those centers where 2 packet stations are needed or VHF is congested

In addition, APRSLink may be used for sending and receiving very short messages that have no attachments. (For other functions, see <http://www.winlink.org/APRSLink.htm>)

High Frequency Network

HF digital messaging is used where there is no coverage by the VHF system.

This uses Pactor in Airmail software.

Messaging can be used:

- Direct to another station, or
- To the internet via a PMBO. The PMBO stores and forwards to internet email addresses
- To other stations via a PMBO. The PMBO stores messages and forwards them to the appropriate station when it next connects to the PMBO

The HF frequencies used are dependent on the time of day. The best frequency can be determined by the propagation prediction included in the Airmail software

Internet

If the internet is available for use in an emergency, it should be used to forward messages to and from the served agencies. This will reduce the traffic load on the radio system.

Operating Guidelines

1. Use voice for urgent messages so that immediate acknowledgement can be provided.
2. Send messages direct to the internet if it is known to be operational. Use the Telnet module in Airmail or a normal email service
3. Minimize the message size:
 - Use plain text in the message, not Rich Text or graphics
 - Keep the message concise and direct
 - If you send attachments
 - a. Save word processing files in .txt before attaching (not .doc files, etc)
 - b. Save spreadsheets as .csv files before attaching (not .xls files, etc)
 - c. If you send photos, process with a photo editor to reduce the size and definition. Then save as .jpg files not larger than 20Kb
 - Do not re-send the message history when replying unless necessary
4. Manage the size of attachments sent to you:
 - a. Limit the attachment size that Winlink will send you. Generally this should be 35Kb max. if you run Pactor3 or 1200 packet. You can set this attachment size by going to the Winlink website, then Message Access, then User Profile. If you run Pactor 1, you will want to reduce this to maybe 10 or 15 Kb.
 - b. If you want to cancel downloading of a large file, you can log on in keyboard mode then LM (List Mine) then either:
 - i. Read the messages you want, or
 - ii. Kill the message that is causing you problems
5. Use your judgment in requesting acknowledgement of receipt of digital messages. Request acknowledgement when necessary, but not for more routine messages.
6. For the availability of Telpac and digipeaters in your area, refer to whichever of the following will be best for your particular case:
 - The Winlink website [map](#) showing Telpac locations
 - The Winlink website [list](#).
 - [The findU site](#), eg nearby stations (edit the callsign)
 - The HCARES website for Telpacs, digis and PMBOs
 - Monitoring of beacons
 - Using APRS, post your position and then send a message to WLNK-1
 - a. Use letter "T" in body of message for a return message indicating the nearest Telpac station position and distance.
 - b. Use letter "M" in body of message for a return message indicating the nearest PMBO station position and distance.
 - Using Airmail in Keyboard mode, connect to a local PMBO via telnet or Pactor on HF, then enter I for information.
7. Do not use digipeaters or nodes unless necessary. This reduces congestion and increases reliability of operation.
8. Try the -10 suffix for digipeating unless you know the exact digipeater suffix. Most telpac stations will respond to a -10 suffix

9. Practice simplex operation with other digital stations using Airmail. (Paclink does not currently support direct station-to-station contact)
10. Refer to training material available on the HCARES website
11. Familiarize yourself thoroughly with your TNC. They will occasionally do unexpected things and will need to be reset.

Station Guidelines

All stations:

1. When commissioning your station, use default parameters for the program. However, you should check these for your individual station:
 - Check your frequency. On 1200bps, it should be within 200-300Hz. This can easily be checked with a tunable receiver or calibrated counter
 - Check your deviation using a meter. Adjusting by ear is not good enough for optimum performance. Set the deviation to 3.0 to 3.2 KHz....no more!!
 - Check the transmit time delay for your particular radio (there can be both good and nasty surprises here!)
2. Look for an Elmer to help out with advice, techniques or test equipment. Some names are listed on the HCARES website
3. Keep your software up to date
4. Keep in practice and expand your skills!
5. Use beacons to announce your presence, but set the time interval for not shorter than every 20 minutes
6. On packet, use the auto check-in feature in Airmail and Paclink to test availability of new stations, or to check reliability of your station with another. Use in moderation.
7. In all installations, make sure you use shielded cables, good grounds and ferrites for RF suppression.

Telpac Guidelines:

1. Use direct modem connections (as opposed to AGW connections) for normal standalone Telpacs. This:
 - Should be more reliable
 - Enables the Telpac to have a KA node if you use a Kantronics modem. (AGW does not have the ability to use a KA node)
2. Use AGW based Telpacs if messaging needs to be part of the system. For example, in an EOC or hospital, this will be more reliable rather than shutting down Telpac to use Airmail whenever messages need to be sent or received
3. Use a UPS or battery backup.
 - It is required to protect against power surges or interruptions
 - Consider how emergency power can be provided in case of power failures (how long is TelPac operation needed, how vital is the TelPac to the network)
 - Include your cable modem, DSL etc in the backup
4. Configure all Telpacs to use both digipeater and KA node functions if possible. For an AGW based TelPac, digipeating will require the use of the AGW digi software.

5. Use standard SSIDs. This will make it easier for users to locate and remember the correct SSIDs. The standards in our County are:
 - Callsign – 5 for the digipeater
 - Callsign – 7 for the KA node
 - Callsign – 10 for the TelPac function
 - Callsign – 11 for a second TelPacInclude the station SSIDs in your beacon text. For example, a beacon text could be:
“W0MAC-10 TelPac located 20 miles NW of Houston.
Also W0MAC-5 digi and W0MAC-7 KA node”
6. Keep your TelPac information up to date on the Winlink and HCARES website

Digipeater Guidelines

1. Do not be too aggressive with settings. Lengthen slot time and lower persistence if the digipeater responds too quickly
2. In AGWDigi, include callsign-5, callsign-7, callsign-10 in the config file.

Should you use Airmail or Paclink?

For packet, you have a choice of using Airmail or Paclink software. Both are excellent programs, but they offer different features.

For guidance on which to choose, refer to:

1. “1-2 Which program.doc” in the [STXARES Yahoo Group Files section](#) under Winlink Workshops
2. Tom N5TW’s [recommendations](#) for Paclink also in the same Files section

Changes!

One characteristic of digital technology is the rate of change in what we can do and how we do it!

To handle this:

1. Please recommend changes to any part of these guidelines, so that we may improve! Send all changes to the Webmaster.
2. Subscribe to the STXARES Digital newsletter every month by emailing tomw@ecpi.com
3. Keep up to date with changes in these guidelines.