HOW-TO DOCUMENT FOR PACKET WINLINK EXPRESS EMAIL ACCESS AT THE ALACHUA COUNTY EOC

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Purpose: This document is to assist volunteers at the Alachua County EOC (Hawthorne Road, right beside the Sheriff station, Gainesville Florida) in being able to perform sending and receiving of two-meter packet WINLINK email to any local Packet Radio Message Server (RMS).   While it is written specifically for that site, the information may be generally applicable and useful to others learning the WINLINK system.

Disclaimer: These instructions may be less-than-perfect, and the equipment and installation may have changed between when these instructions were written and your intended operation.   Use them as a starting point, be flexible and enjoy learning!

> **There are several YouTube videos that can also be helpful:**
> *What is Winlink?* by K4REF: https://www.youtube.com/watch?v=qGhUfW8pjY8
> *Using a Sound modem TNC...* by K4REF: https://www.youtube.com/watch?v=RF0OMNZCEVA
> *Setting up sound levels....* by K4REF: https://www.youtube.com/watch?v=7G1DBs-04MM

1. **COMPUTER:** The EOC has a fast Windows-based computer with a large LCD monitor, which has USB ports along its left side, just behind the front surface.   You will use one of those ports to plug in the Signalink.
2. **USB CABLE:** In order to use the SIGNALINK audio interface, a USB cable must be inserted into a USB port of the chosen WINDOWS computer and connected to the SIGNALINK audio interface. The cable provided is a shielded cable and I have inserted ferrite beads at both ends with a turn of cable in the beads to further suppress RFI.   I have not yet seen RFI problems at the EOC. (If the USB port ever does freeze, close the application, remove the USB cable from the computer port; reinstall the USB cable into the computer port and re-start the program.)
3. **RADIO CABLE**: The SIGNALINK must then be connected to the desired radio.   The cables to do so have RJ-45 modular pugs on them, and there is one cable for each radio, as they are radio-specific.   Be certain that the cable you need, is plugged into the radio that you plan to use.
   - **Mobile 2 meter transceiver** beside the computer.   Simply replace the mic with the yellow RJ45 cable and plug the other end into the rear of the Signalink. You will still hear the audio through the transceiver speaker.   Set the digital audio for "soft background level" so you can just listen to it.   The volume control DOES affect the signal to the Signalink.
     - **SETTINGS:** The TX gain on the Signalink should be at the 8 o'clock position, and the RX gain will likely be in the 12 o'clock position if your

audio over the speaker is just quietly audible.   Packet signals should make a clear line on the soundmodem waterfall display.   The DELAY should be turned fully counter-clockwise to minimum.

- **ICOM 2-meter transceiver on the opposite side of the room from the computer.**   A cable is provided to replace the mic and connect to the Signalink.
  - **Settings:**   TX gain is likely to require the 8 o'clock position; DELAY at minimum, and adjust the RX gain until packet signals are clearly visible as a line on the waterfall of the soundmodem display.
- **HF:** See the separate set of instructions to operate the Yaesu Series 600 HF transceiver for WINLINK at the Alachua County EOC.
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4. **UZ7HO SOUNDMODEM.EXE:**   This is interface software which connects to the SIGNALINK and wraps it in such a way that it appears to be a KISS (keep it simple) mode TNC (terminal node controller, a device used to send and receive AX.25 packet data and possibly other modes as well).   You will need to start this software, clicking the desktop icon for it.   I suggest to arrange it in the right hand corner of the screen. The screen capture below is from a different computer, but the soundmodem display is the same.   You'll probably find the icon along the left column of the EOC computer.
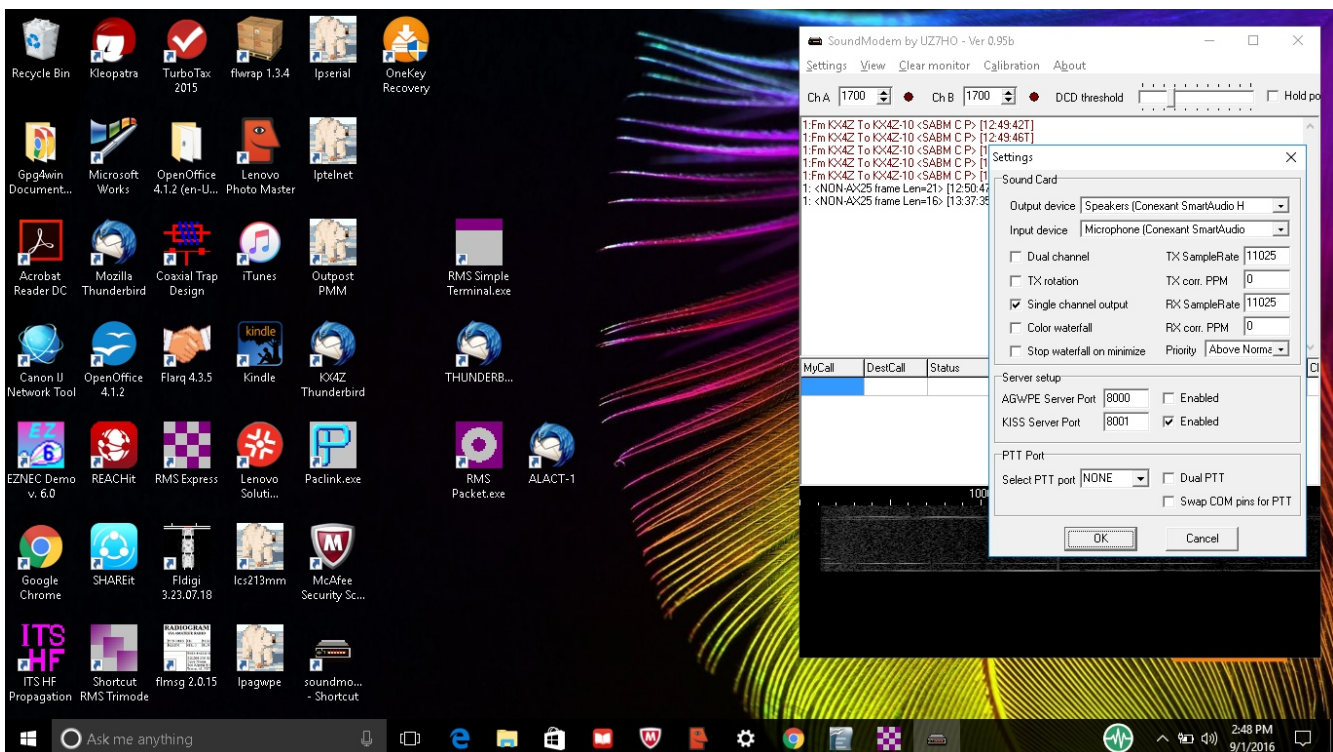

5. Check the **Setting | Devices** that the audio is going to the SIGNALINK and not to the computer mic and speakers – the connected devices for output and input should include the word "USB".

6. Check the `Setting | Devices` that the **KISS SERVER PORT** is checked enabled, and set to port **8100**

7. It is unlikely that you will need to adjust the `Settings | Modems` but the A modem should be set to **VHF AX.25**.
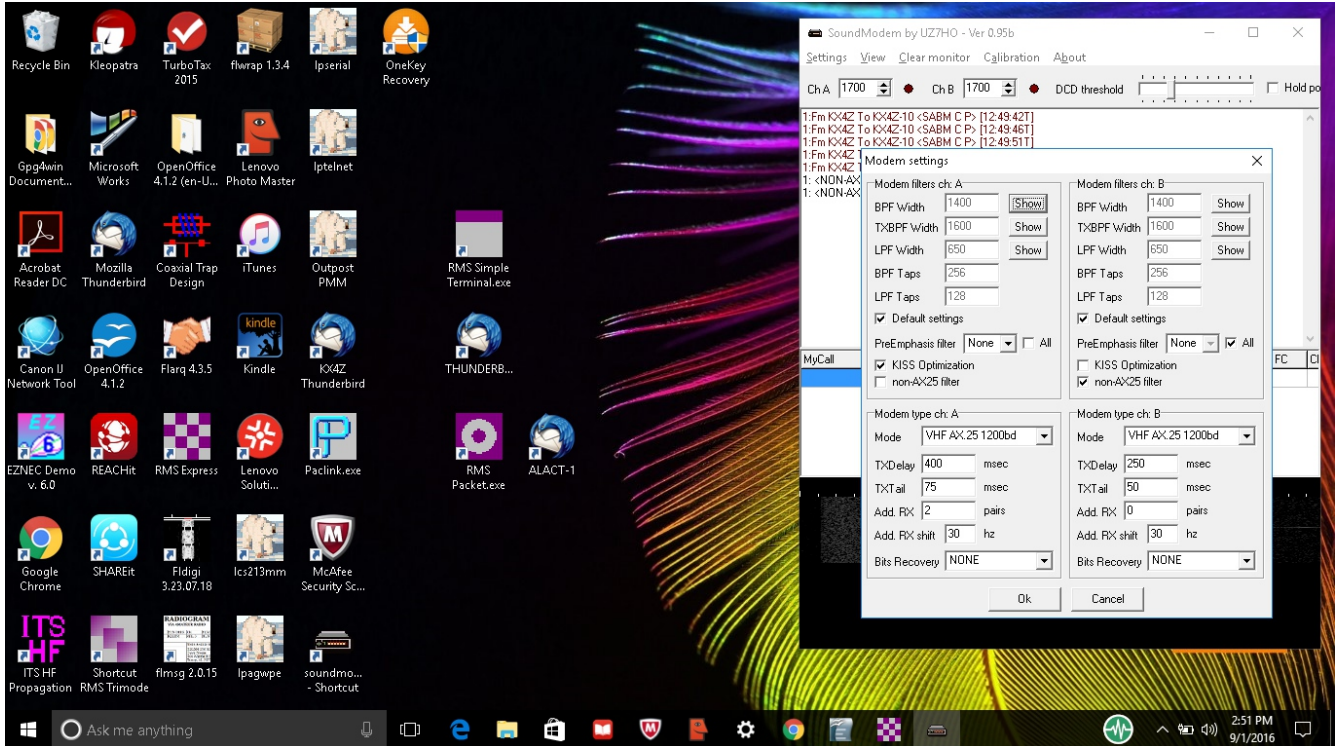

8. **WINLINK EXPRESS.** Start up the WINLINK EXPRESS software. I suggest that it be positioned in the left half of the computer screen.

9. **CALLSIGN:** After starting the WINLINKEXPRESS software, at the upper left corner you will need to select the proper CALLSIGN for your operation. If your callsign isn't listed, you
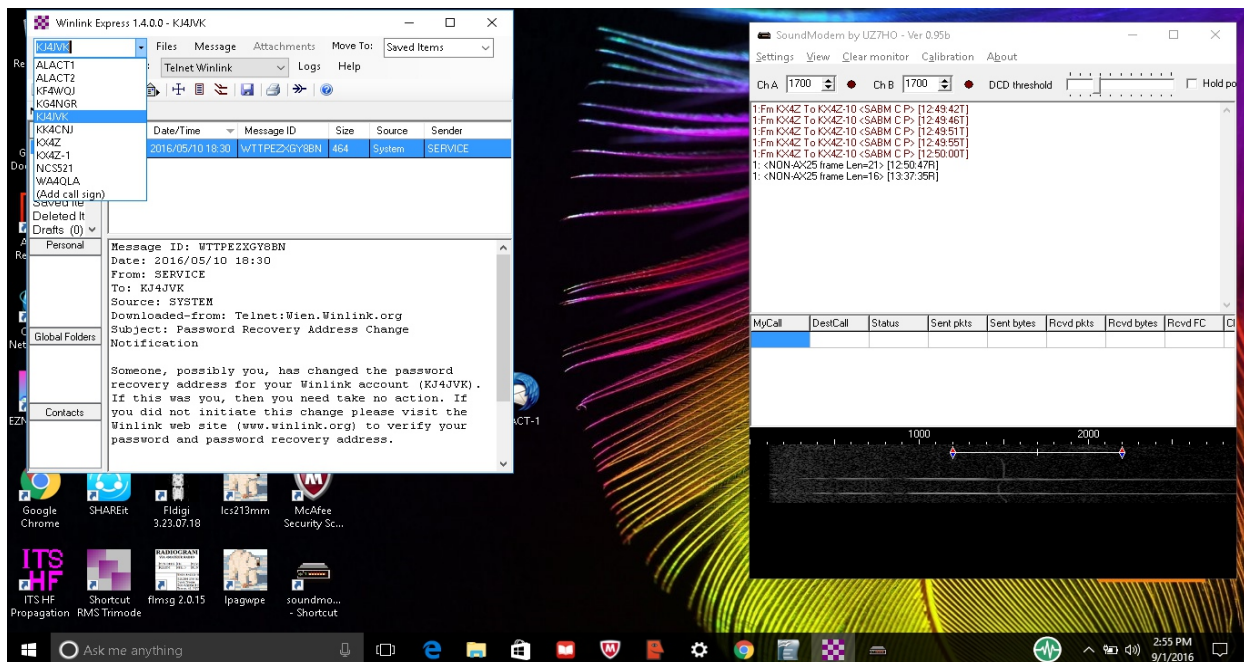
can add yourself and run through the setup information which mainly involves putting in your WINLINK password and adding some location information about yourself.

10. **OPTIONAL REGISTRATION:** If the software requests a "registration" number , just wait a moment and it will give you the option to "remind me later"

11. **Writing an Email Message.**   If you wish to create an email, that option is under `Message | New Message` and works pretty much like any email system.   There is a contacts list that you can access by clicking on TO: or CC: buttons.   Emails allow attachments, but the size may be limited to 40K (or some other number) due to the limited bandwidth available.   Once you are finished with your email, be certain to `Post to Outbox`, which queues it up to be transmitted on the next connection to a RMS (radio message server).   You should see the number in the OutBox increment by 1.

12. **Selecting Packet Winlink:**   In order to connect over PACKET, you will select `PACKET WINLINK` in the "Open Session" drop down, and then click the `CONNECT` icon (which looks like a pin connecting to a jack, or an arrow catching up to the tail fletching in front)
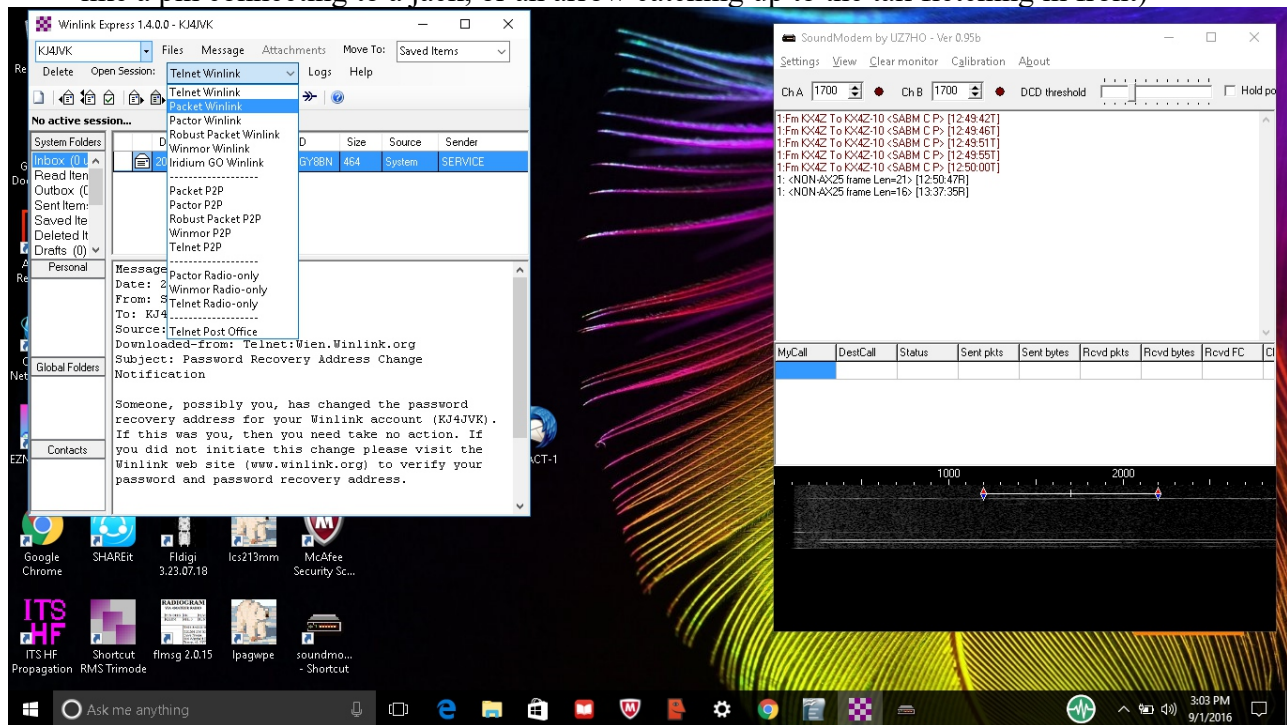
13. **Settings:**   Once you have the Session dialog open, you may wish to check the `SETTING` to verify that it is correctly set for `KISS TNC` (provided in software by UZ7HO soundmodem.exe) and using TCP connections on 127.0.0.1 (your computer's "myself" address, on the exact same port (8100) that the soundmodem.exe software is expecting you to be on. Speed is 1200 baud, `MAXFRAMES=1` and the `packet length` may be either 64 or 128.
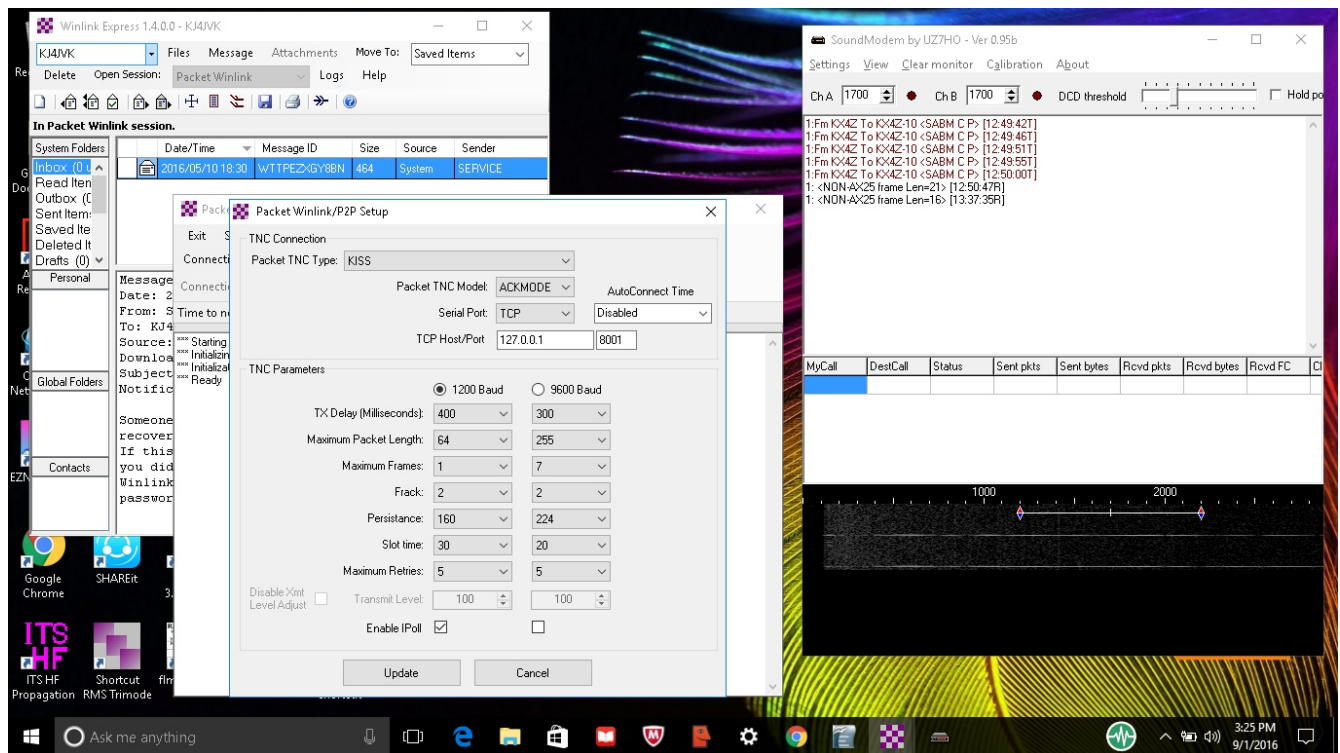
14. **Path to RMS:** Once you have the Session dialog open, you'll want to select **DIGIPETER** and attempt to connect to KX4Z-10 (or another Packet RMS) and use the local W4DFU-7 digipeater in the first Digipeater box.
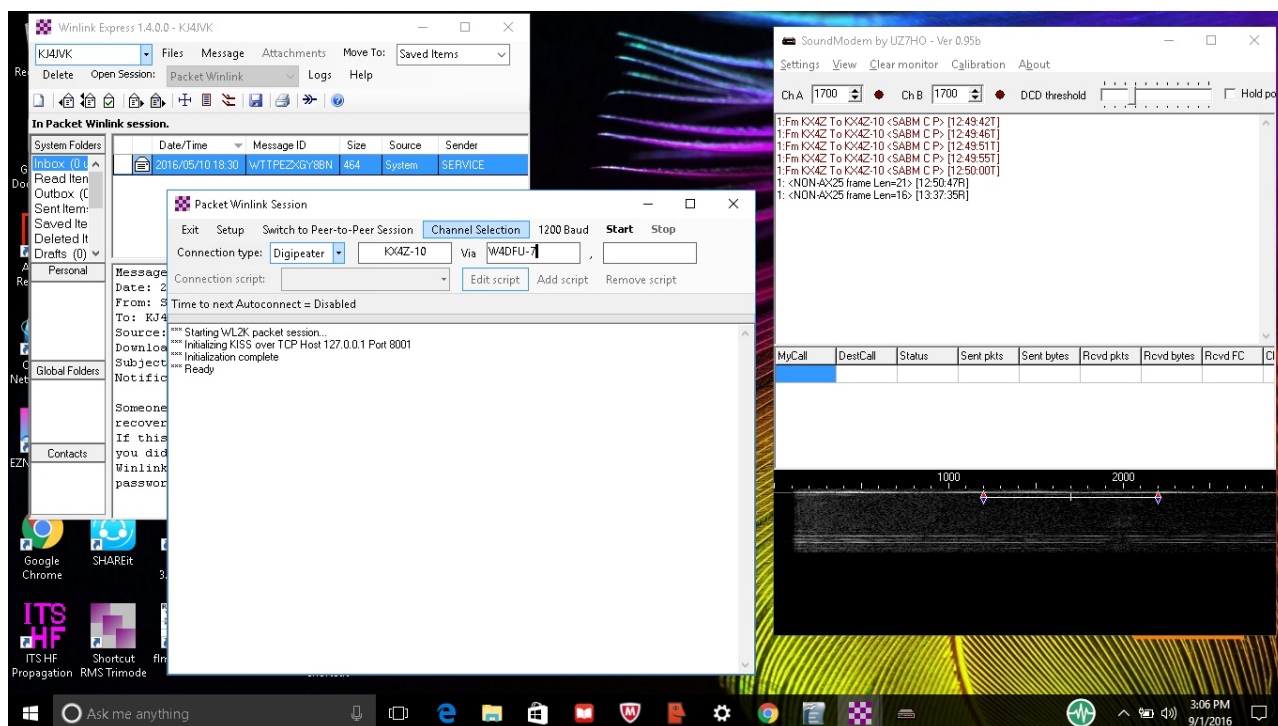
15. **START** When you Click **START**, you should see the system begin to send packets in an attempt to connect to the RMS.   Packets can be observed on the soundmodem.exe monitor screen, and overall progress observed on the WINLINK session dialog box.   You can tell transmitted packets because they appear in RED.   You can tell digipeated packets because there will be an asterisk (*) after the callsign of the digipeater.   R3 inside a packet header indicates "ready for packet #3) and S3 indicates "sending #3".   SABM is an attempt to make a contact.   P means a request for immediate acknowledgement prior to any other packets being sent. REJ means that the recipient did not get a good packet and is going to ask for a repeat of something.

16. **ALTERNATE FREQUENCIES**/ROUTES FOR CONNECTIONS

> We have two complete different frequencies to reach working RMS servers, which gives resiliency.   One is on the SEDAN frequency 145.770, and the other piggybacks on the APRS frequency 144.390, principally because the community tends to have available digipeaters on that frequency of which many will allow passage of WINLINK connected packets (APRS packets are UI (unconnected)). Here are the two chains possible:
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> **SEDAN FREQUENCY:**
> The EOC cannot current reach KX4Z-10 (145.770) by direct connection.   A relay is required.   W4DFU-7 (145.770) is a sedan station that can either digipeat or "connect" and pass WINLINK traffic, and it is a strong station.   Additionally, KE4BQI-7 in Lake City (145.770) can be heard by KX4Z-10.
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> Possibilities;

DIGIPEATING: EOC <--digipeat--> W4DFU-7 <---digipeat---> KX4Z-10

CONNECT: A connect script that will likely work is:

```
C W4DFU-7
CONNECTED
C KX4Z-10
WINLINK
```

APRS FREQUENCY: 144.390   (BACKUP)
The EOC cannot current reach KX4Z-11 or KX4Z-12 (144.390) by direct connection.   A relay is required.   W4DFU-3 (144.390) is an APRS digipeater station that can digipeat WINLINK connected packets, and it is a strong station. Additionally, there is a community-based digipeater KM4EVZ-3 (144.390) that has a strong signal into KX4Z-11 / KX4Z-12 but cannot be reached directly from the EOC.   W4DFU-3 does not allow "connecting" so digipeating is the only option on this (backup) frequency..

DIGIPEATING (1 hop):   EOC <--digipeat--> W4DFU-3 <---digipeat---> KX4Z-12   all on 144.390
DIGPEATING (2 hops):   EOC <--digipeat--> W4DFU-3<--digipeat--> KM4EVZ-3 <--digipeat--> KX4Z-12, all on 144.390

17. **Don't Use Stop:** If possible, avoid using **STOP** to interrupt the communications unless truly necessary as this sometimes causes significant problems to the remote message server (which is a computer, and doesn't always respond the way you wanted.)

18. **Settings Explanations:** To give the best chance at communications (and not necessarily the best throughput) the **SETTINGS** are typically for a **PACLENGTH** of 64 or 128, and a **MAXFRAMES** of 1.   The reason for the pitifully small **MAXFRAMES** (before an ACKnowledgement) is that some of the digipeaters our group is dealing with have a software bug and can't handle back to back packets.

19. After the connection is made, any emails sitting in the Outbox will automatically transfer without any further effort on your part.   If there are emails waiting for you to download, depending on software settings, you may be offered a list and asked to check the ones you wish to download.

20. **Troubleshooting;**
    ◦ You can generally see on the Waterfall (Fast Fourier Transform display) of received signals whether your received volume is right or not, and you can certainly readjust if needed.
    ◦ Listening to your transmitted packet with a spare 2 meter transceiver will allow you to confirm that your are indeed transmitting, and if need be you can adjust your TX

(transmitted audio level) on the SIGNALINK by adjusting it while listening to your signal and placing it in the range where it is NOT maxed out (hence, overdeviating).
- ○ There is always the chance that the RMS you are attempting to target has malfunctioned, if you are unable to raise it. If you are getting good digipeats of your signal, then you know you have an outgoing signal that makes sense.

FREQUENCIES:

SEDAN FREQUENCIES: 145.770
KX4Z-10   Winlink RMS Packet server   145.770
W4DFU-7   Node, part of SEDAN, able to digipeat   145.770

APRS FREQUENCIES: 144.390   (this is only as a backup to the sedan frequency)
KX4Z-12 and KX4Z-11   Raspberry PI RMS packet server   144.390
W4DFU-3   Dental Tower digipeater   144.390
KM4EVZ-3   strong local aprs digipeater   144.390

Map to find other packet stations: http://www.winlink.org/RMSChannels   (Click the PACKET option for vhf PACKET stations)

Further information of SEDAN: http://www.fla-sedan.com/sedanhowto.html
Florida SEDAN map: https://www.google.com/maps/d/viewer?
hl=en&gl=us&oe=UTF8&msa=0&ie=UTF8&mid=1bi77YLXYRDJSviGBeDs-5mzh0HU

For initial emergency email, we are using the W4DFU-7 node as a digipeater and hence we are forced to use the SEDAN frequency of 145.770.   Since you aren't "connecting" to any further SEDAN stations up or down the link, your packets will not bother other users elsewhere. As of this writing, there is very little usage of the W4DFU-7 node anyway.

As our group develops additional assets, we may move our frequency or provide additional RMS frequencies.

WHAT HAPPENS TO YOUR EMAIL:

You would be using this software for real in the circumstance that no Internet is available in your area due to any of several causes. It is likely then that KX4Z-7 (the RMS to which you are connecting) will also be without Internet (though which your message would have otherwise flowed quickly).   In this emergency instance, KX4Z-7 will transfer your email to a WINLINK software RMS RELAY, which will queue it up to be transmitted by HF (high frequency) ham radio on the next slot, which is typically within 30 minutes. At that time, an automated digital ham radio call will be placed to the station predicted to have the best signal. If that is successful, your email heads out to that station – which normally would refuse the connection if they had no means to send it further.   If that connection is unsuccessful (which can happen due to band interference, poor signals, recipient software failure and

other reasons) then another station will be tried and so on.   It may not be speedy but the WINLINK system tries very hard to get your email out.

If the VHF packet systems do not function for you, the next option is to send out your email over HF WINLINK using the Red Cross HF transceiver.   In this case, you will be searching for a receiving station with a strong signal that is functioning properly.   This is more work, but has a higher probability of getting your email out quickly.

The VHF packet system connection to KX4Z-7, upon your first connection to it, will list you as a "subscriber' and take steps to obtain all your incoming email where possible – so the easiest way to get incoming email will be to check the KX4Z-7 packet server for incoming email.

"Tactical" email addresses for Red Cross administrators also exist, and are more fully explained in a separate document regarding PACLINK.   However, these are "known to the system" as attached to KJ4JVK and will be automatically downloaded whenever KJVJVK connects, and thus will be made available to tactical (non-ham) Red Cross administrators

These explanations merely go over the "high points" of tactical email handling within WINLINK.   For more information, consult more indepth resources via the Web.

ADDENDUM:

Operating a ham radio station is more than just knowing which buttons to push.   One wants to become smooth, fast, and polished to move information rapidly and accurately.   These are similar to the skills needed for "contesting".   One possible improvement to the ham radio setup at the Red Cross would be to link the VHF microphone and digital inputs to the speaker, so that with a simple switch one could flip back and forth between voice and digital --- allowing one to quickly move to sending an impotant document by MT63 for example, and then returning quickly to voice, without needing to remove/reinsert mic and speaker connections.   Don't be surprised if your radio setup has been modified to have speed-enhancing shortcuts such as that.