Winlink Express Overview and Installation

What is Winlink

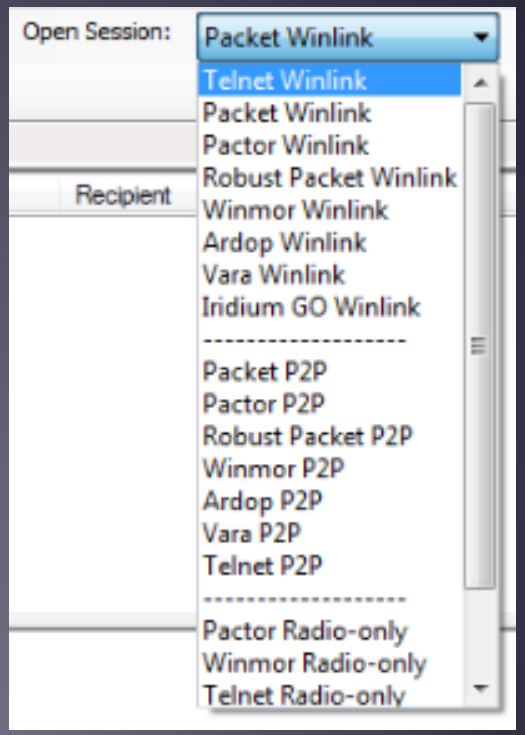
- Worldwide system for sending e-mail via radio.
- Provides e-mail from almost anywhere in the world.
- Entirely supported and operated by amateur radio volunteers (Amateur Radio Safety Foundation, Inc.).
- Winlink Express software is the preferred client application.
- Adopted for contingency communication by many government agencies.
- Used by infrastructure-critical NGOs such as International & American Red Cross, Southern Baptist Disaster Relief, DHS Tiered AT&T Disaster Response& Recovery, FedEx, Bridgestone Emergency Response Team, etc.

Winlink Connection Modes

- **Telnet** – Non-radio connection through the Internet. Good for training (no radio equipment required) and use if radio is down or network is busy.
- **VHF/UHF Packet** (local LOS propagation) –
  - **9600 baud** – Fast, reliable, range may be limited and requires $400 modem (Kantronics or SCS Tracker) or a good soundcard (non-Signalink) modem. Radio must be 9600 capable.
  - **1200 baud** – Slower, but can use inexpensive TNC like Byonics TinyTrak-4, TNC-X, or even soundcard modems. Will work with virtually any FM radio.
  - **Experimental Speeds –** Between 1200 and 9600 using PSK and sound card interfaces

Winlink Connection Modes

- **HF WINMOR/ARDOP** – "Poor man's Pactor". Not as good as Pactor, but operates with an inexpensive sound card device ($100), speeds between Pactor 2 and 3.
- **HF Pactor ~~1~~, 2, 3 and 4** – Fast and reliable but requires an expensive modem ($1500+). Pactor 4 not permitted in US.
- **Vara** – Muli-carrier OFDM with 2.4kHz bandwidth. HF speeds approaching PACTOR 4 (possible optimization for FM coming)
- All RF modes can be Peer-to-Peer (P2P).



Resources Needed for Winlink Express

VHF/UHF Packet Radio

- Computer running Windows 7 through Windows 10.
- Microsoft .NET 3.5 framework.
- V/UHF radio with data port (1200/9600) or speaker/mic connection (1200 only).
- Packet TNC (Kantronics, TNC-X, MFJ, etc.), or USB soundcard interface (SignaLink or similar). TNC might require a USB to RS232 Serial dongle.
- Note: Some new radios have built-in soundcards/TNC's.
- Software downloads:
  - https://winlink.org/WinlinkExpress
  - All software is free, donation is suggested.

Packet TNC

- Can be simple KISS mode, or full function.
- Cost from about $100 to $1500.
- Radio needs to have a data port (1200/9600), or use microphone and speaker connections (1200 only).
- Some radios include a built-in TNC or sound card.
- Might require a USB to serial adapter (built-in on TNC-X)
  - Use FTDI chipset devices for best results

Packet TNC

- Prolific chipset USB to serial converters have driver issues.
- Counterfeit Chinese products used Prolific product ID and “piggy backed” on official Prolific drivers.
- Prolific countered by changing the hardware/drivers so the counterfeit devices would not work with their drivers.
- This website may help: http://www.ifamilysoftware.com/news37.html
- Adapters based on the FTDI chipset do not have this problem (yet anyway).

SignaLink Soundcard Interface

- Simple device powered by USB connection.
- Cost is about $100 including radio-specific cable.
- Radio needs to have a data (sound) port, or use microphone and speaker connections.
- Need to run “Software TNC” application such as Direwolf, or UZ7HO soundmodem.

Hardware TNC or Sound Card?

There are advantages to both

Hardware TNC

- Relatively low cost (TNC-X), old one in the closet?
- Probably the simplest connection.
- No additional software needed.

Sound Card

- Can be used for other digital modes besides Winlink.
- Software TNC has superior decode over older hardware TNC.
- Can be used for both Packet, Winmor, ARDOP and Vara.

Hardware TNC or Sound Card?

There are disadvantages to both

Hardware TNC

- Only does packet (or maybe Pactor too).
- Older units do not perform as well, no new development.
- Will require USB to serial adapter.

Sound Card

- Sound levels and other settings may be changed unexpectedly.
- Requires additional software, and a slightly more complex operation (more training?).

Hardware TNC or Sound Card?

Presenter Soapbox

1200b AFSK Packet must die!

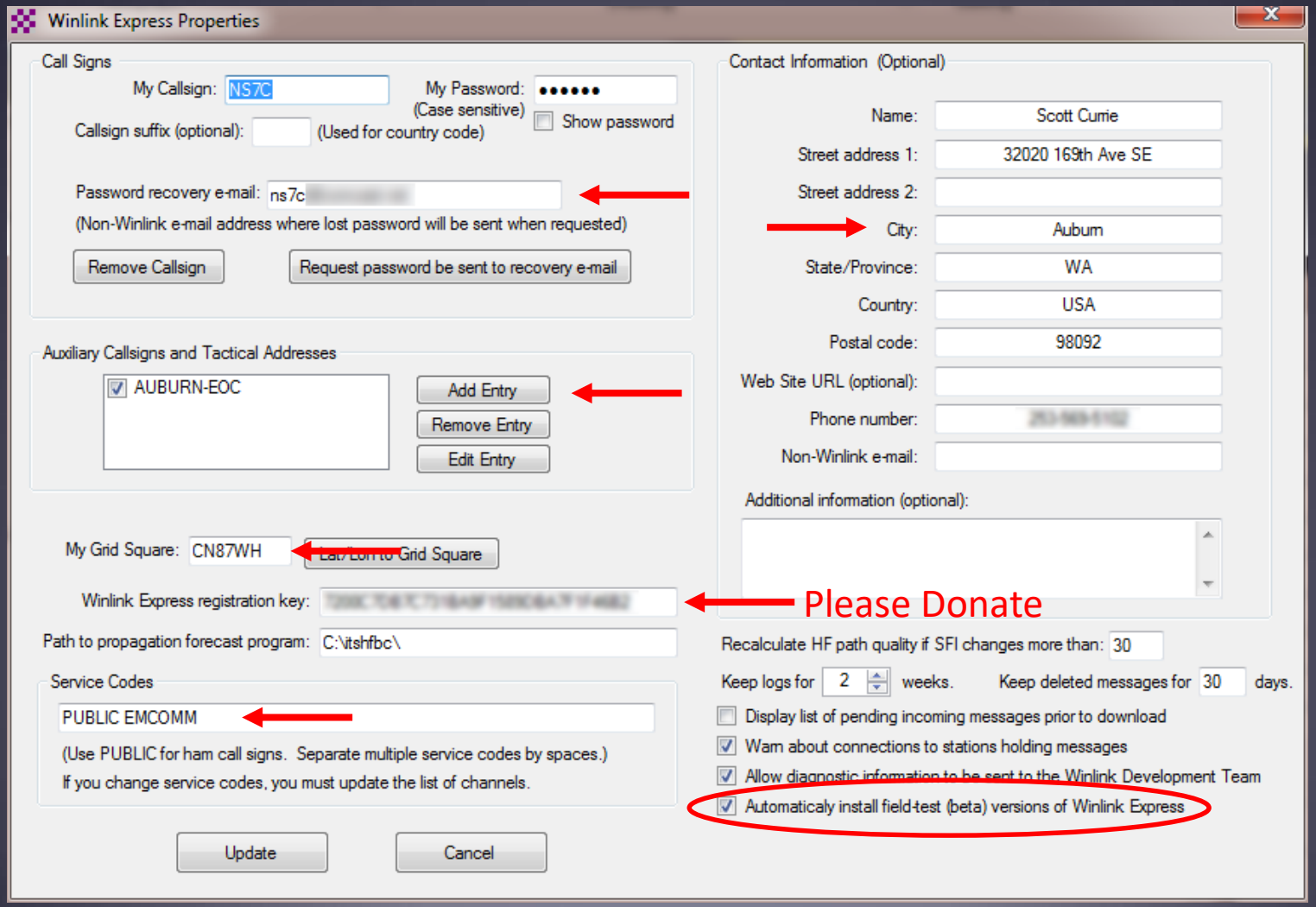
While this mode is relatively easy to setup and get working, and we must retain this capability for certain conditions, it is time to move up to faster modes.

Both Direwolf and UZ7HO provide several options for higher speed communications using PSK modulation. 4800b should be easy to achieve for most setups. They also support G3RUH 9600b compatible with hardware TNCs. Modern radios should handle this speed.

Installing Winlink Express

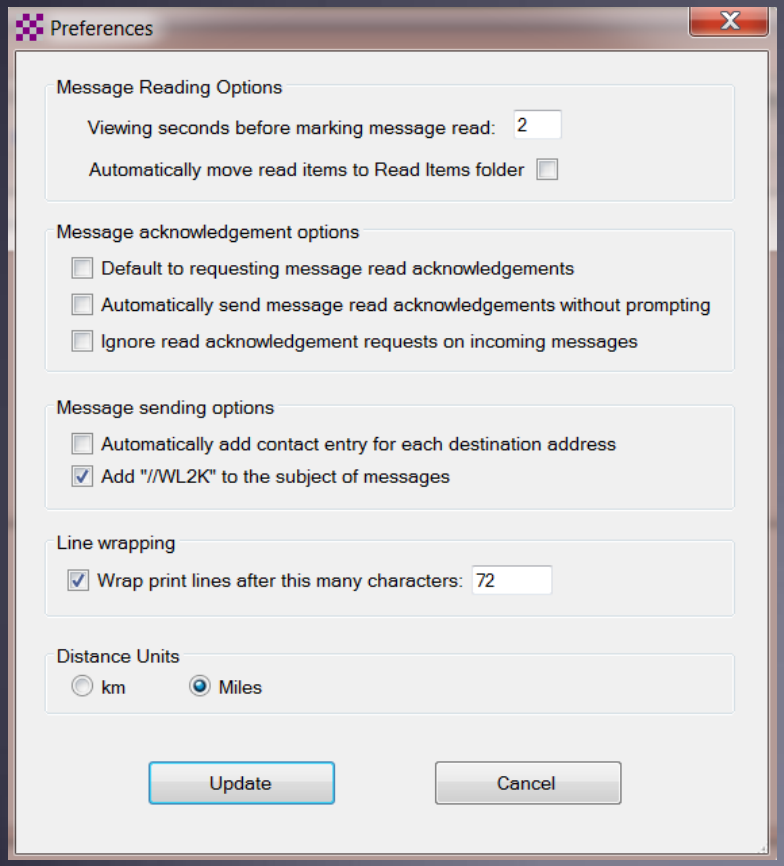
- Download zip file:
  - https://winlink.org/WinlinkExpress
  - Search engines may send you to fakes
- Extract the .msi installer from the zip file and run it.
- Complete the setup screens (call sign, location, etc.).
- Browse C:\RMS Express\, right click on.
  - RMS Express.exe and select option to create a shortcut.
  - Change the shortcut name to Winlink Express.

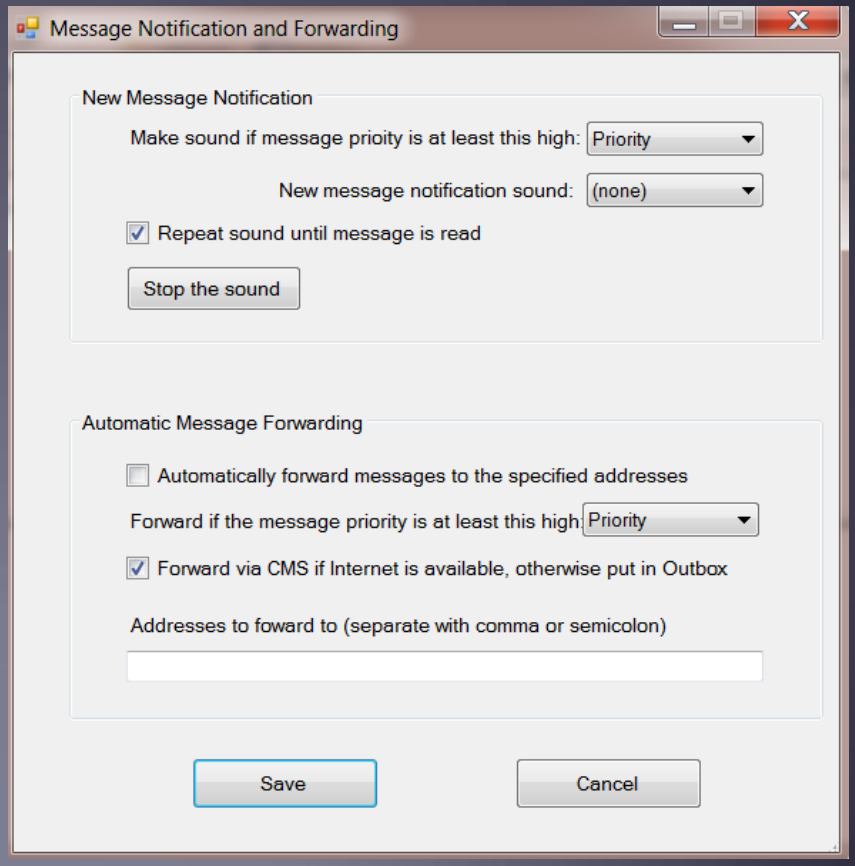
Winlink Express Initial Setup



User Preferences

- Click “Files” followed by “Preferences/Message Notification”



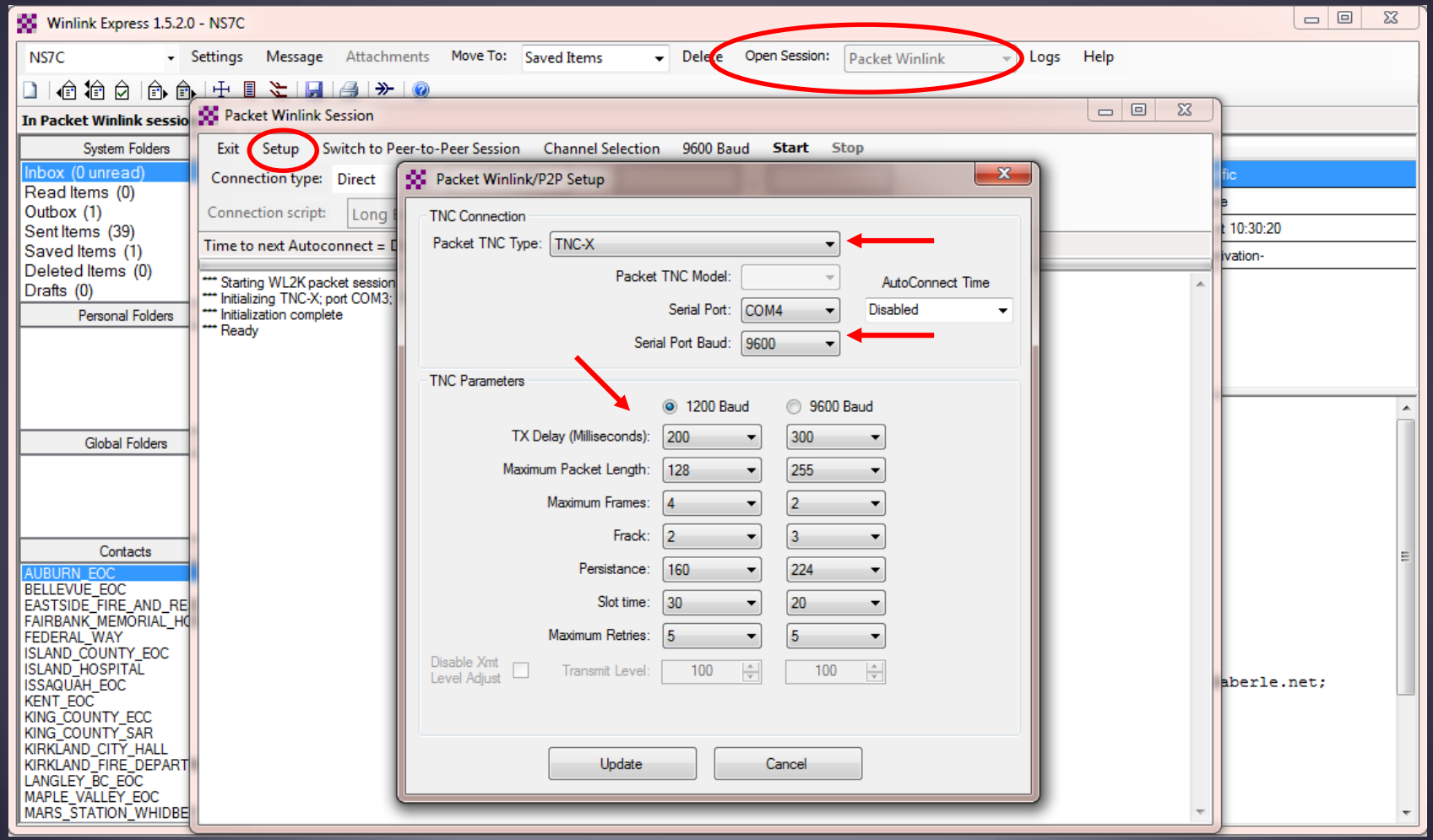


Installing Winlink Express

- The first time you originate a message using Winlink Express, you will be registered in the Winlink system and will have a callsign@winlink.org address. This account remains active as long as you use is regularly. Inactive accounts will be purged after about 1 year.
- You will also have access to the Winlink Webmail system and other good tools on the Winlink.org website.

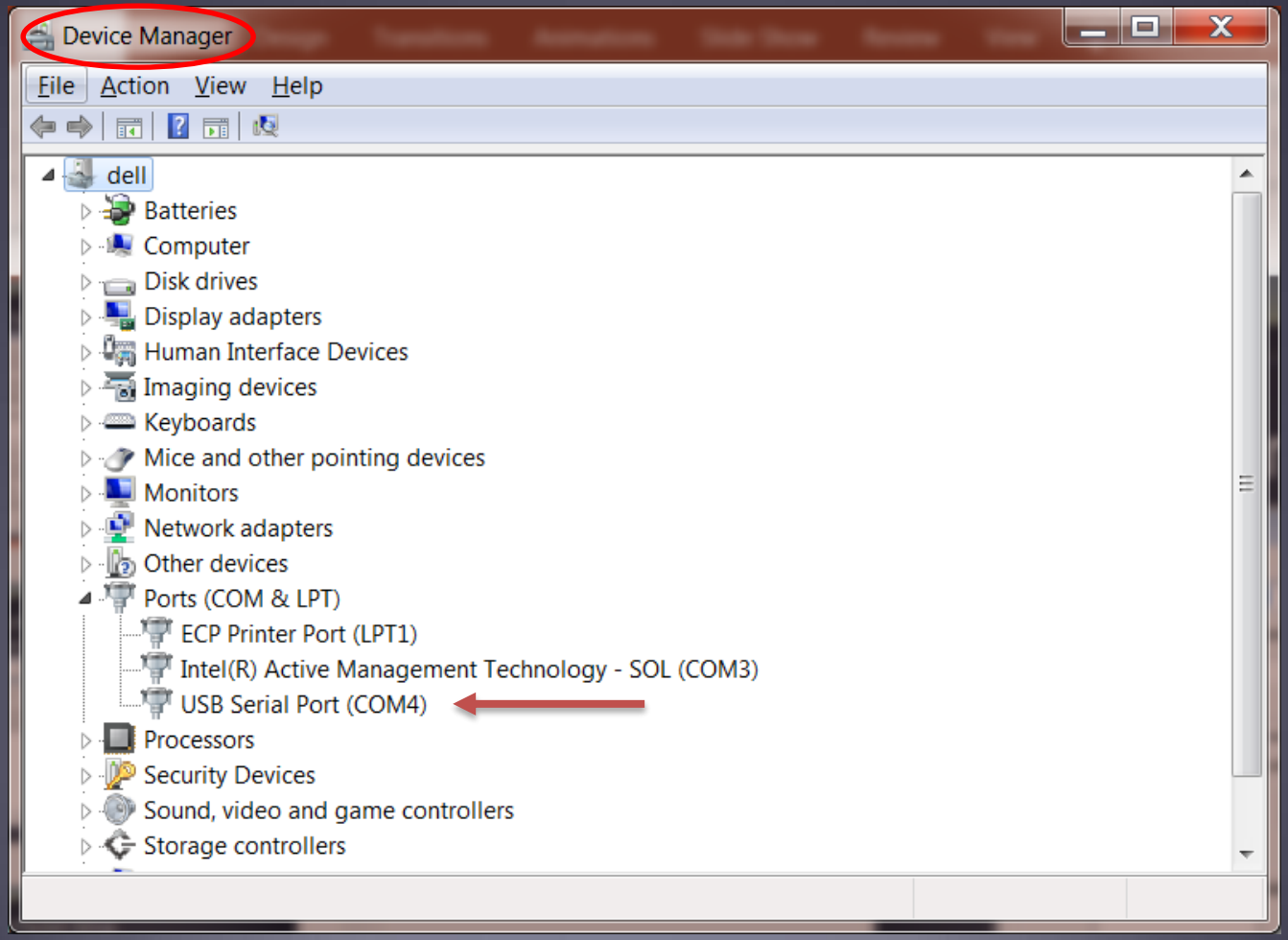
Initial Packet Setup

Hardware TNC



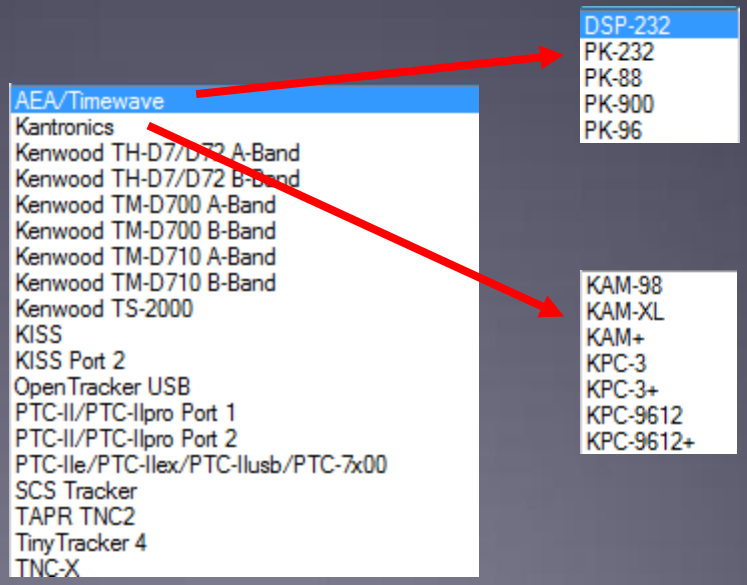
Initial Packet Setup

Hardware TNC COM Port



Initial Packet Setup

Hardware TNC Selection



Initial Packet Setup

Sound Card Interface

- Download zip file (UZ7HO low speed):
  - http://uz7.ho.ua/modem_beta/soundmodem97.zip
  - Extract the program from the zip file and run it.
  - Configuration settings from the drop down menus.
  - Windows only, firewall message.

- Download zip file (UZ7HO high speed):
  - http://uz7.ho.ua/modem_beta/hs_soundmodem15.zip
  - Extract the program from the zip file and run it.
  - Configuration settings from the drop down menus.
  - Windows only, firewall message.

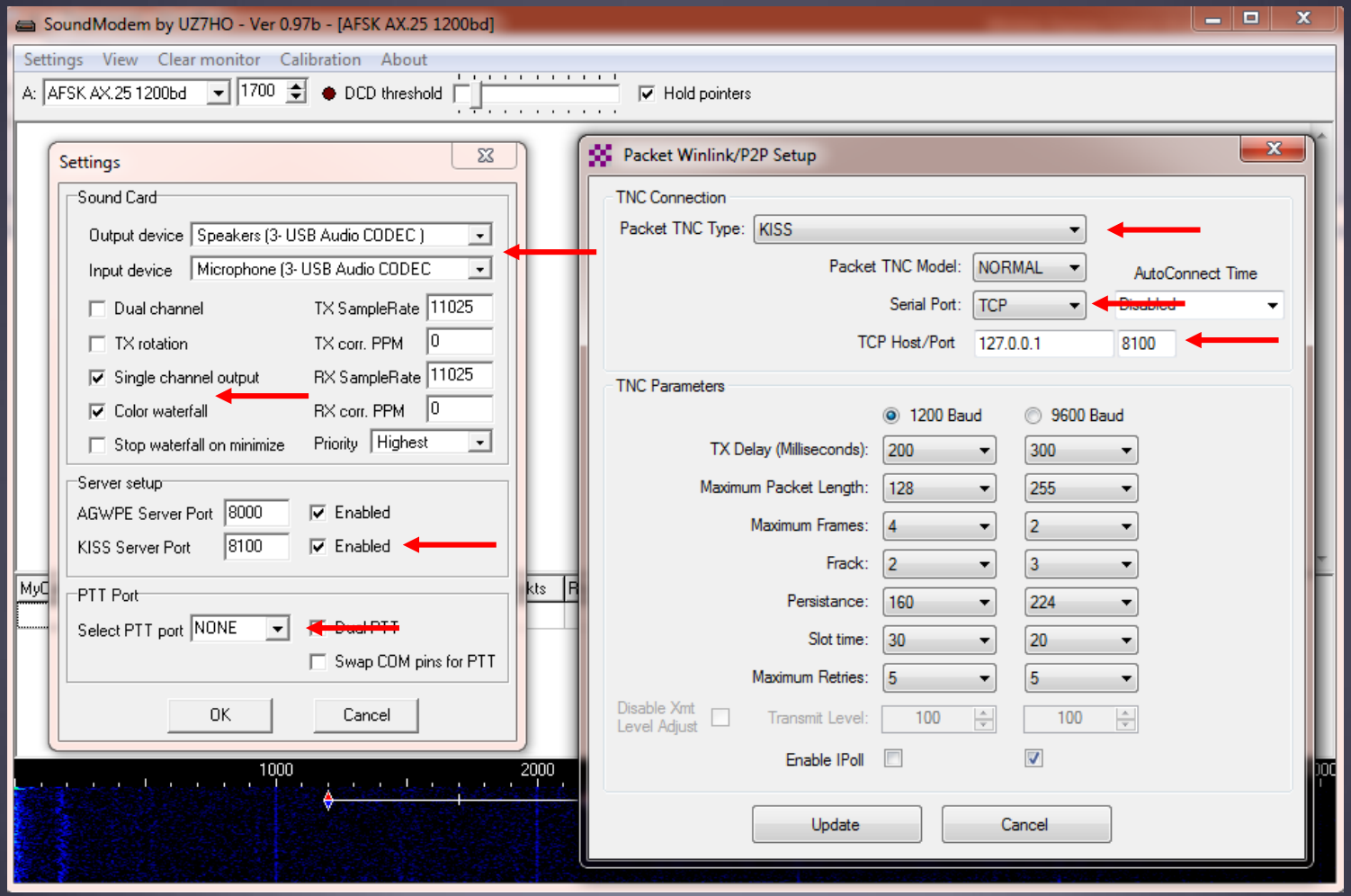
Initial Packet Setup

Sound Card Interface

- Download zip file (Direwolf):
  - https://github.com/wb2osz/direwolf/releases
  - Extract the program files from the zip file and run the app.
  - Edit the INI file to configure.
  - Multi-platform capable, for Linux/OS-X, download the source and compile (git clone, etc.)

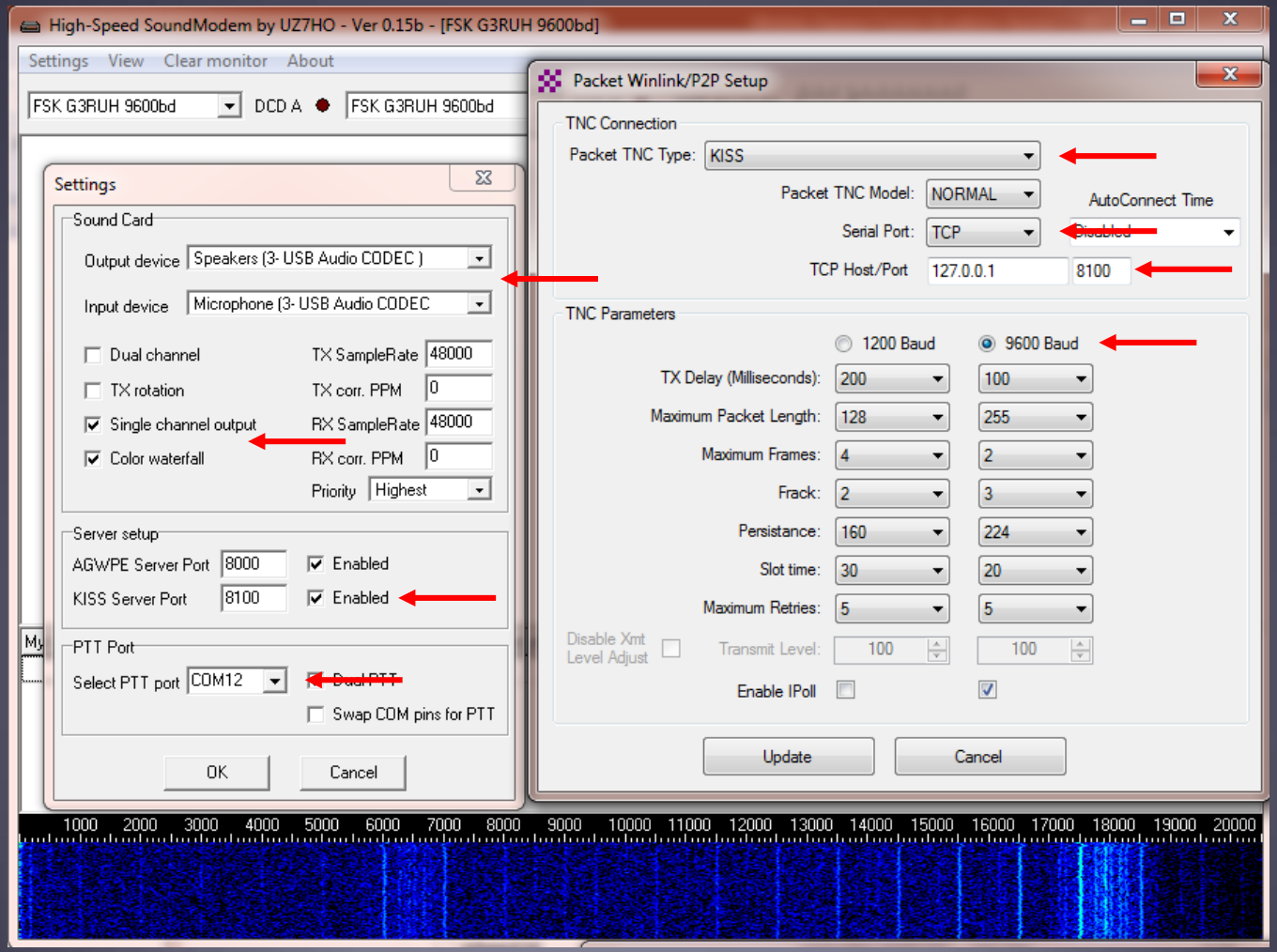
Initial Packet Setup

Sound Card Interface (UZ7HO and Signalink)



Initial Packet Setup

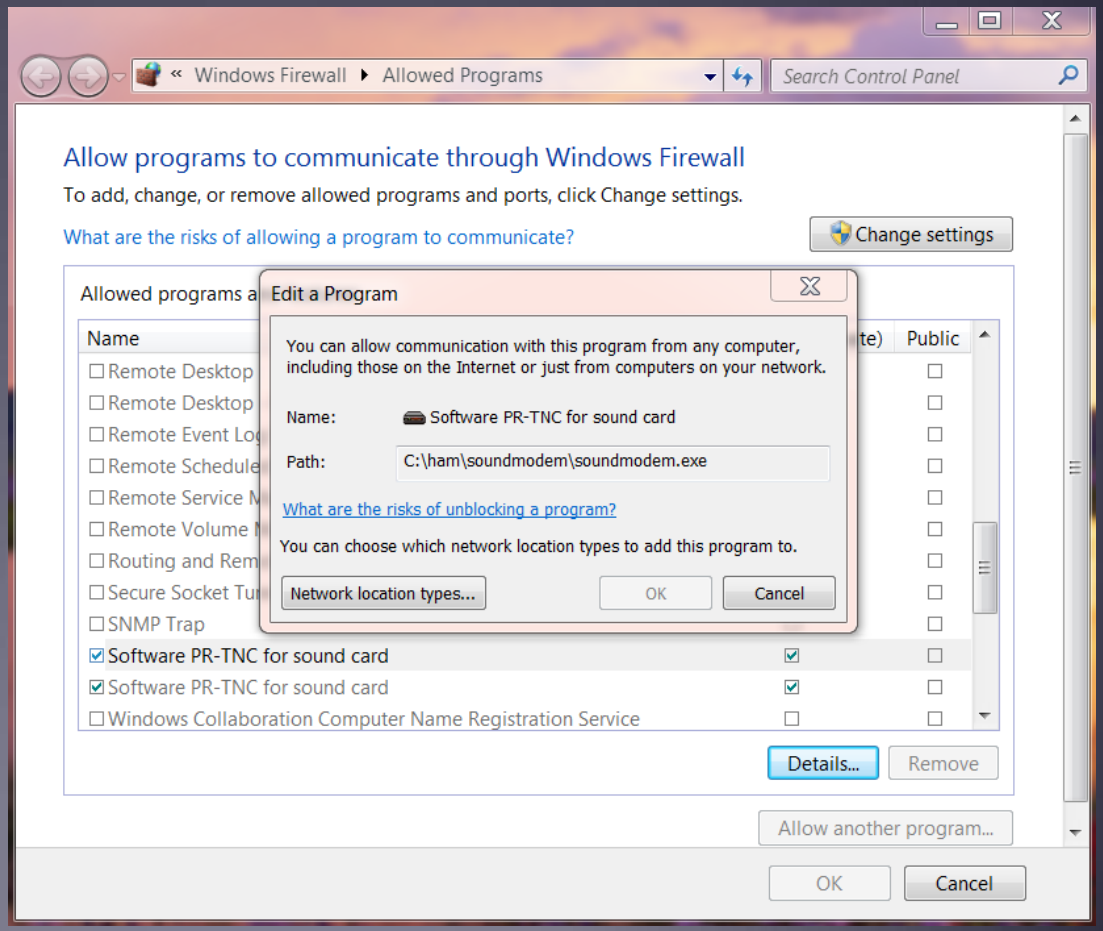
Sound Card Interface (UZ7HO High Speed)



Initial Packet Setup

Sound Card Interface (UZ7HO)

UZ7HO and Direwolf both create “KISS TNC” servers within the network stack, ports on the firewall must be opened to allow Winlink Express (and other applications) to use the virtual TNC.

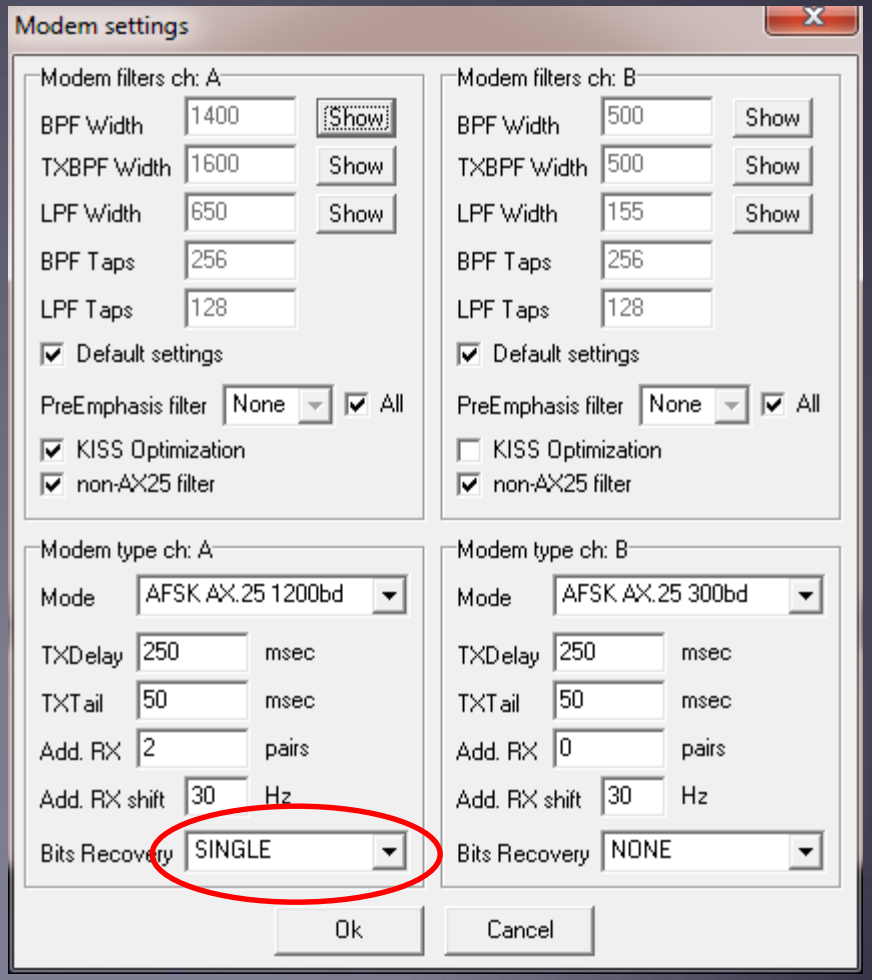


Initial Packet Setup

Sound Card Interface (UZ7HO and Signalink)

UZ7HO and Direwolf both allow for multiple modems using a “stereo” sound card, for Signalink, only modem “A” is available. Set to AFSK AX.25 1200bd modem.

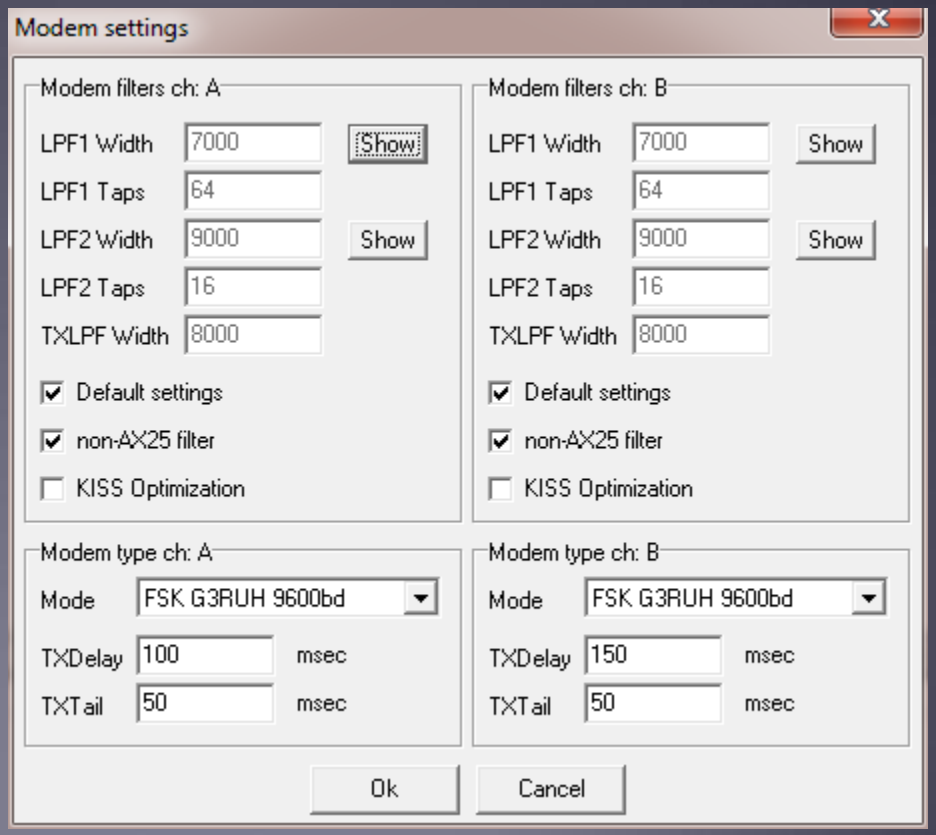
Both programs can try to correct single bit errors. This is NOT advised for EMCOMM.



Initial Packet Setup

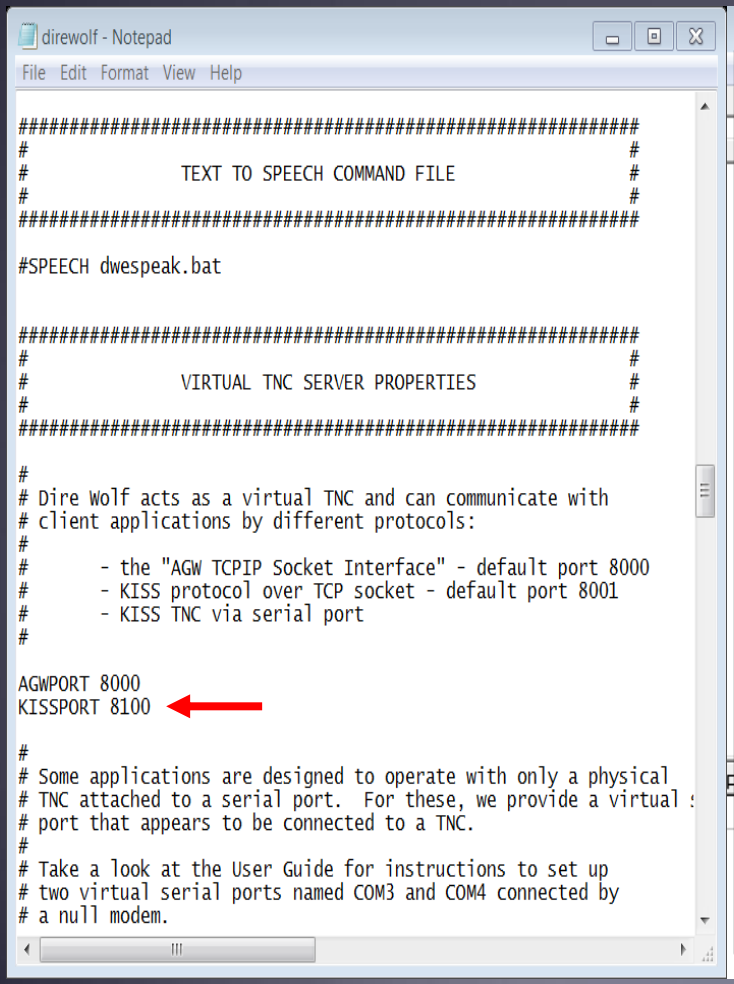
Sound Card Interface (UZ7HO High Speed)

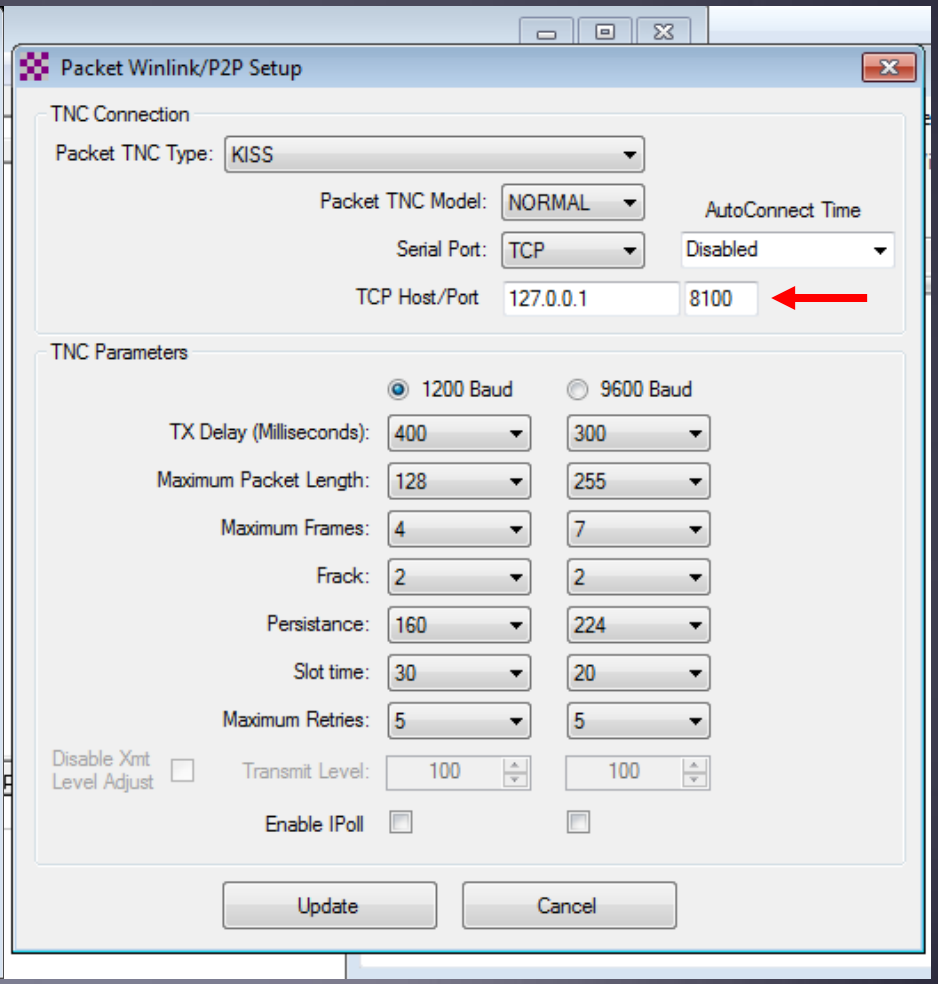
UZ7HO and Direwolf both allow for multiple modems using a “stereo” sound card. For initial setup, only use modem ch “A”. Set to FSK G3RUH 9600bd modem.



Initial Packet Setup

Sound Card Interface (Direwolf and Signalink)





Initial Packet Setup

Sound Card Interface (Direwolf High Speed)

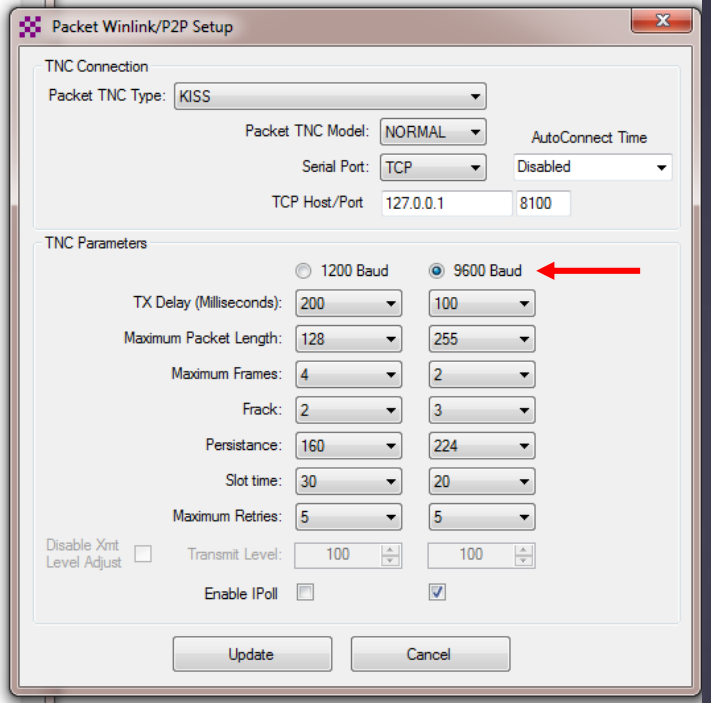
direwolf.conf - Notepad

File Edit Format View Help

```
#       9600    High speed - Can't use Microphone and Speaker connections.
#
# In the simplest form, just specify the speed.
#

#MODEM 1200
#MODEM 300
MODEM 9600

#
# These are the defaults should be fine for most cases.  In special situations,
# you might want to specify different AFSK tones or the baseband mode which does
# not use AFSK.
#
#MODEM 1200 1200:2200
#MODEM 300  1600:1800
#MODEM 9600 0:0
#
#
# On HF SSB, you might want to use multiple demodulators on slightly different
# frequencies to compensate for stations off frequency.  Here we have 7 different
# demodulators at 30 Hz intervals.  This takes a lot of CPU power so you will
# probably need to reduce the audio sampling rate with the /n option.

#MODEM 300 1600:1800 7@30 /4


#
# Uncomment line below to enable the DTMF decoder for this channel.
#

#DTMF

#
# If not using a VOX circuit, the transmitter Push to Talk (PTT)
# control is usually wired to a serial port with a suitable interface circuit.
# DON'T connect it directly!
#
# For the PTT command, specify the device and either RTS or DTR.
# RTS or DTR may be preceded by "-" to invert the signal.
# Both can be used for interfaces that want them driven with opposite polarity.
#

PTT COM4 RTS
#PTT COM1 RTS -DTR

# The Data Carrier Detect (DCD) signal can be sent to the same places
# as the PTT signal.  This could be used to light up an LED like a normal TNC.
```

Uncomment 9600

Specify PTT port used

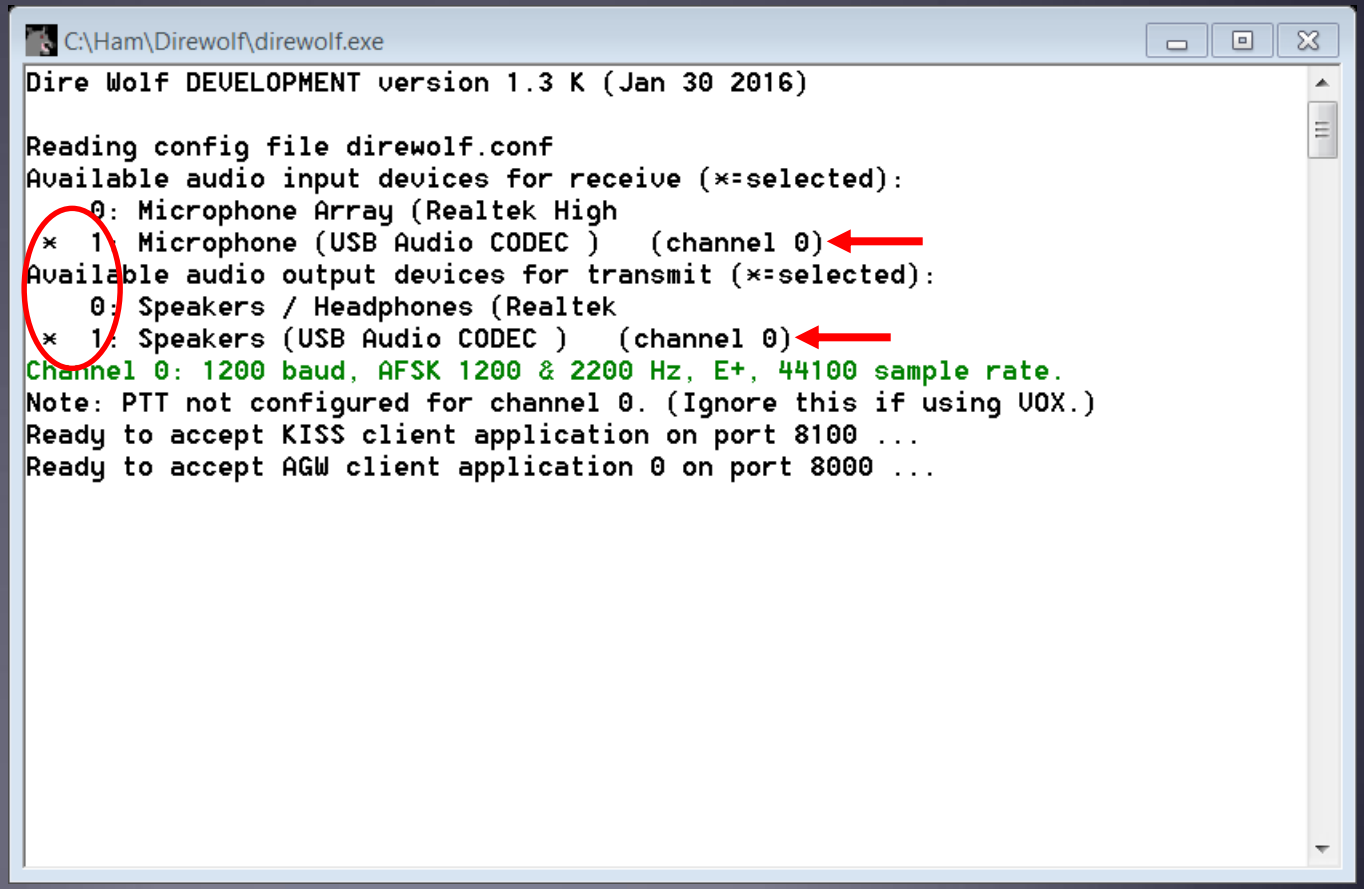


Initial Packet Setup

Sound Card Interface (Direwolf)

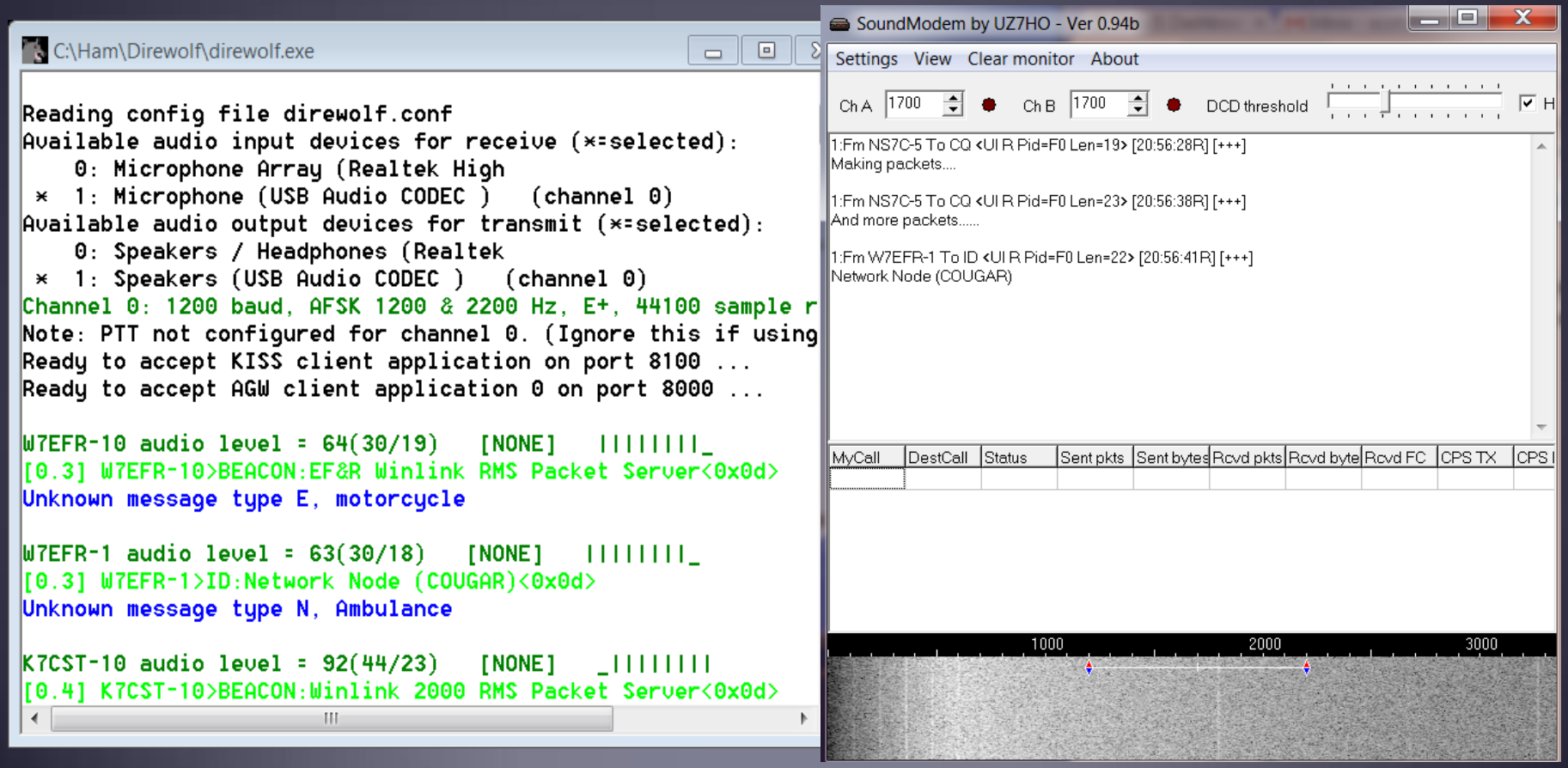
Direwolf startup shows available audio devices. Signalink shows as USB Audio Codec.

Sound card to use needs to be set in the configuration file (there are multiple ways to do this).



Initial Packet Setup

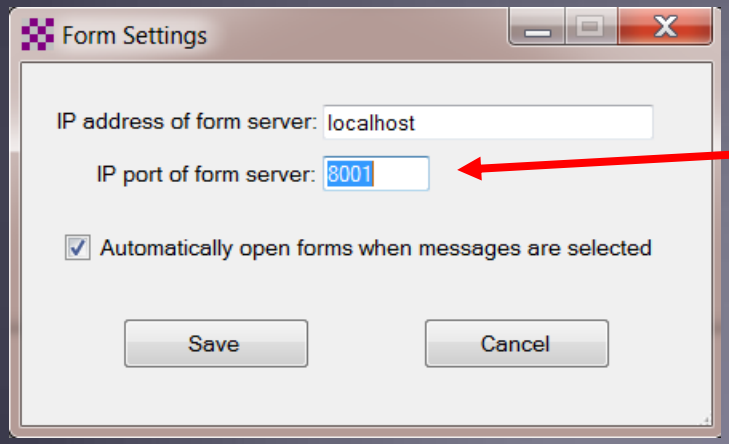
Sound Card Virtual TNC

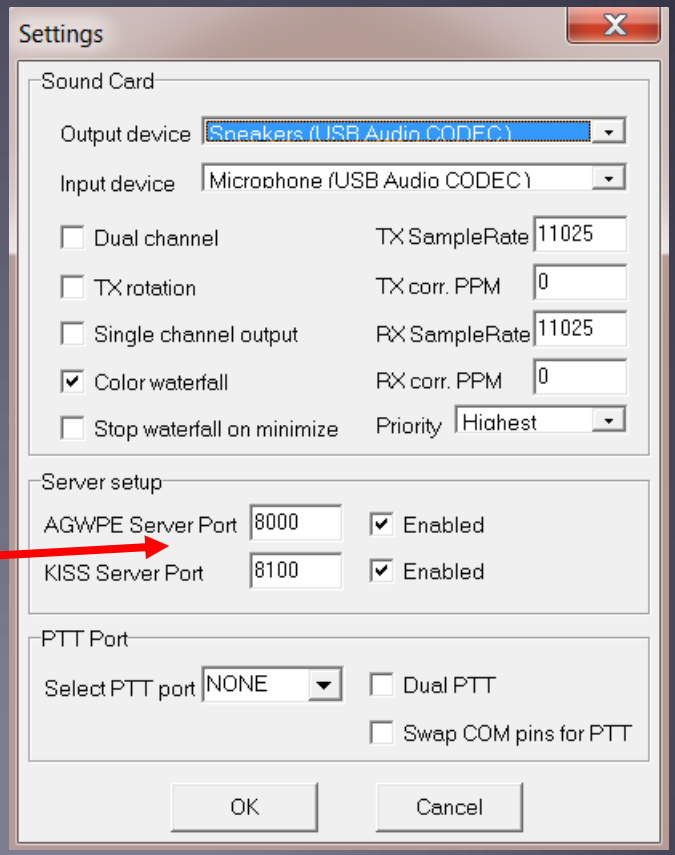


Initial Packet Setup

Sound Card Virtual TNC

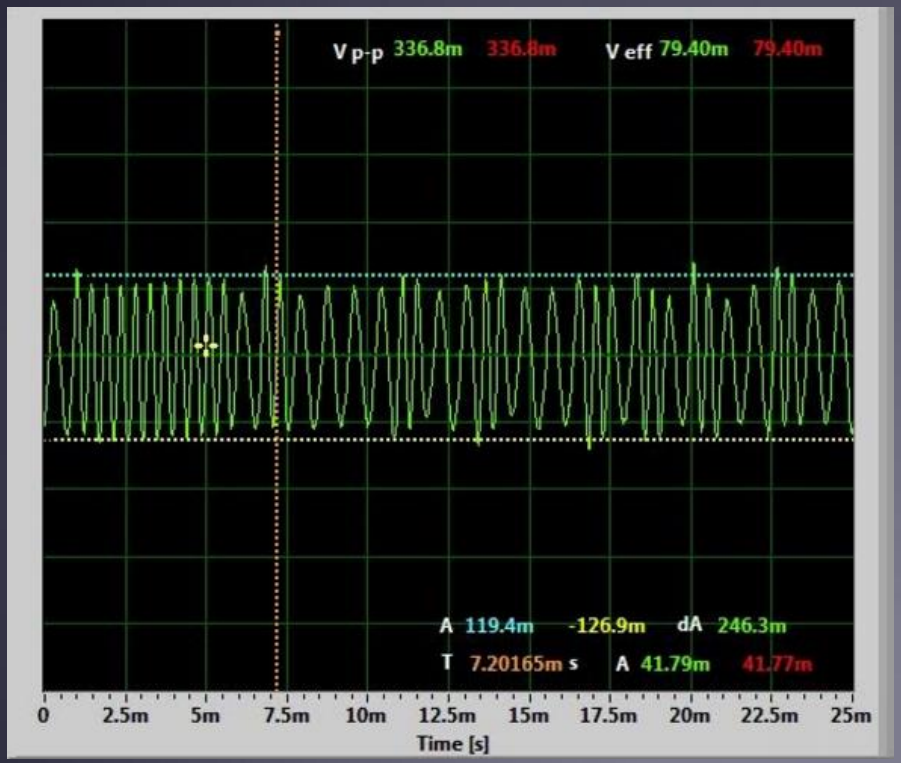
Make sure your Virtual TNC server TCP ports do not conflict with the Winlink Express forms server (Direwolf default KISS port settings will).

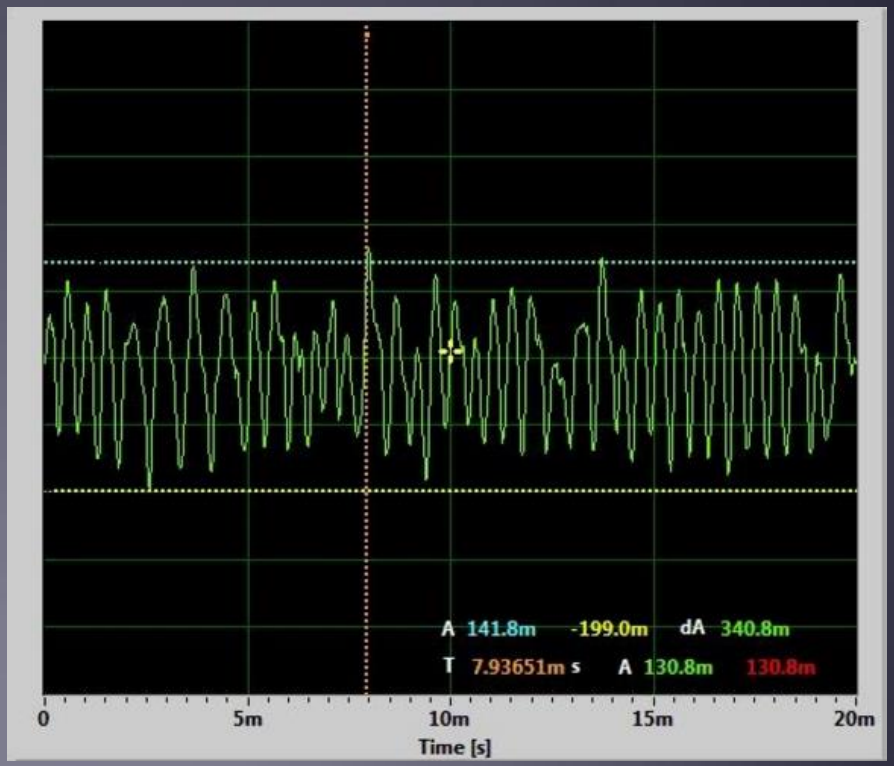




Initial Packet Setup

Set your transmit levels correctly! (It is not plug and play)

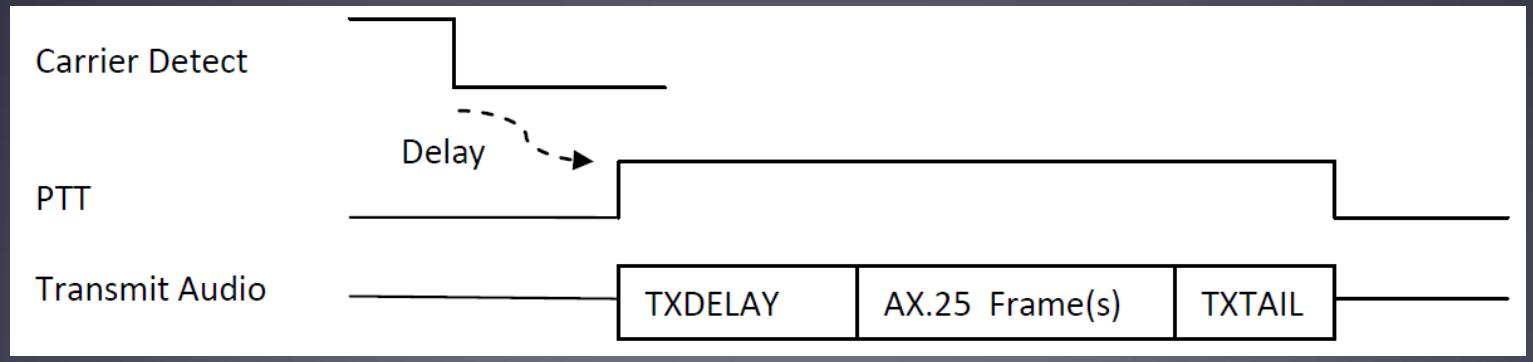


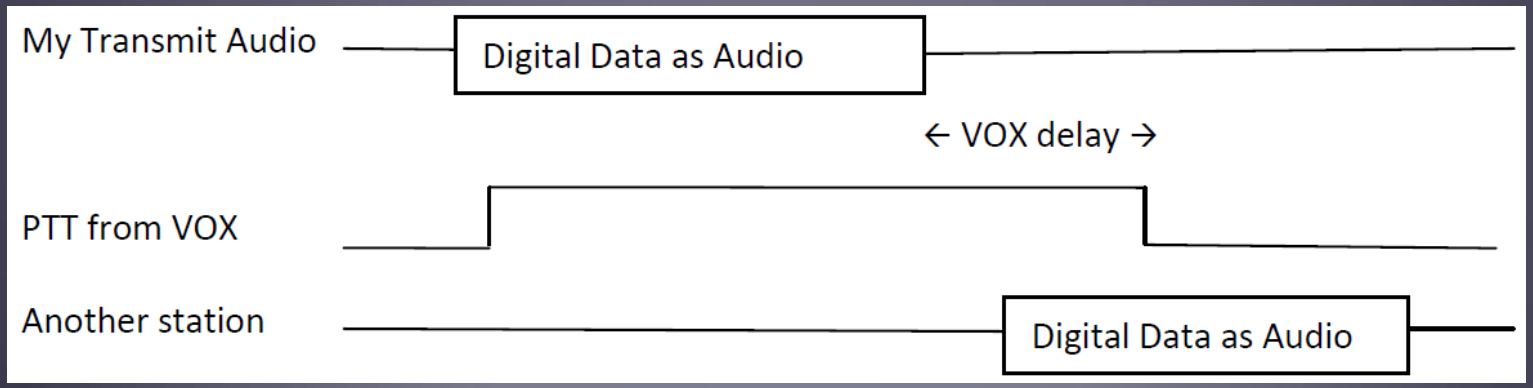


- http://www.febo.com/packet/layer-one/transmit.html
- http://www.zeitnitz.de/Christian/scope_en

Initial Packet Setup

Set your TXD and VOX correctly (This isn't plug and play either)



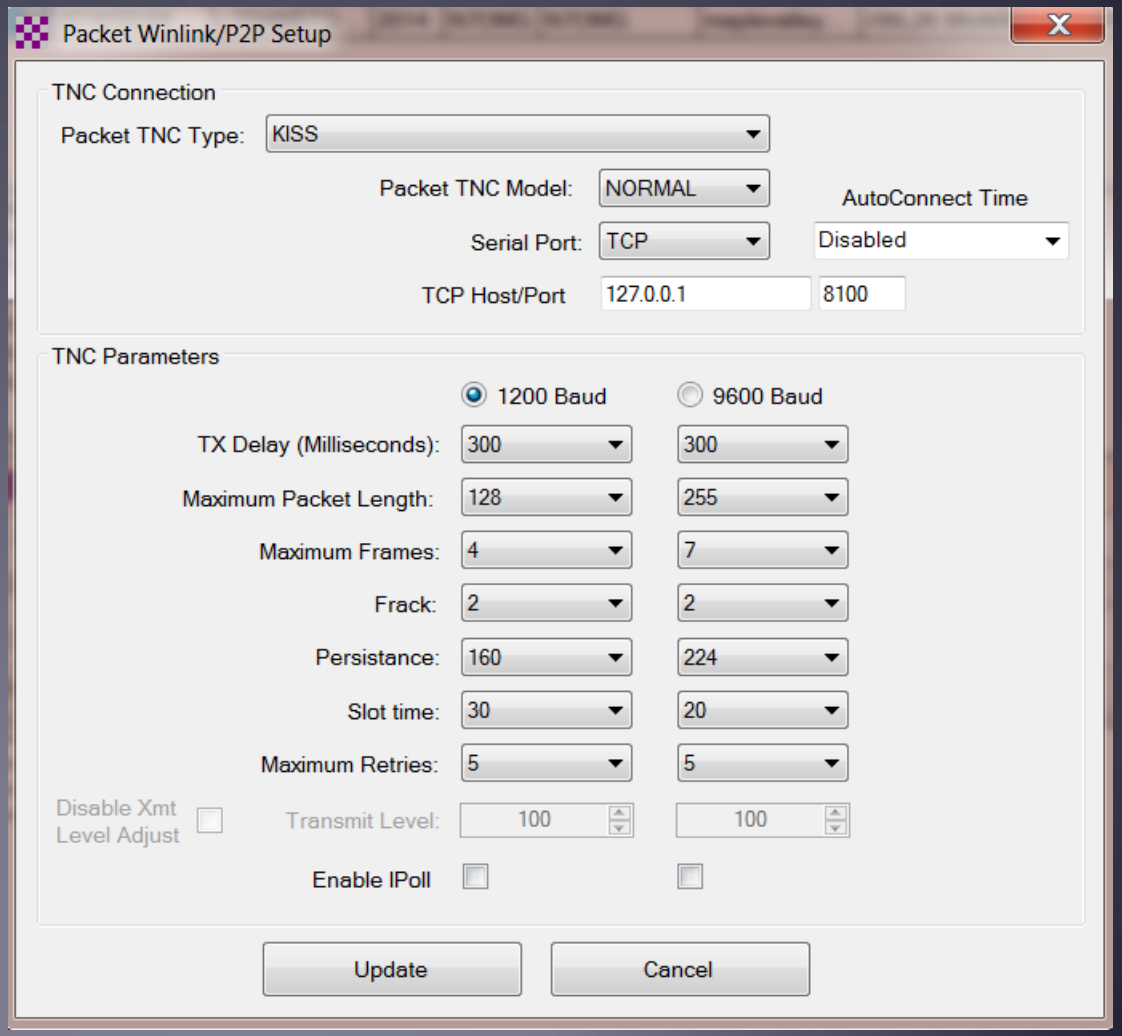


Initial Packet Setup

Important Parameters

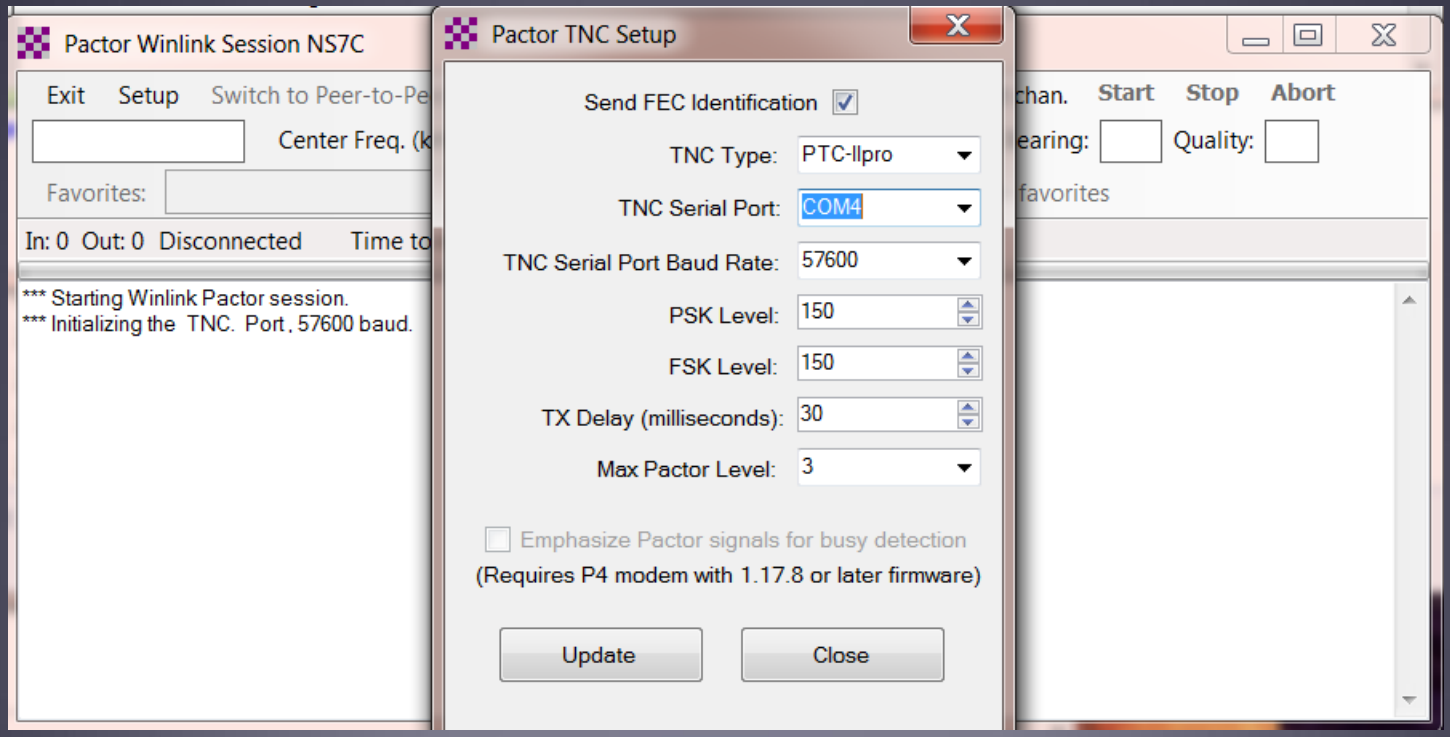
- TX Delay (TXD)
- Packet Length
- Max Frames
- Frack
- Max Retries
- AutoConnect Time

Note: For soundcard configurations, TXD is set in the Software TNC application.



Initial Pactor Setup

PTC modem



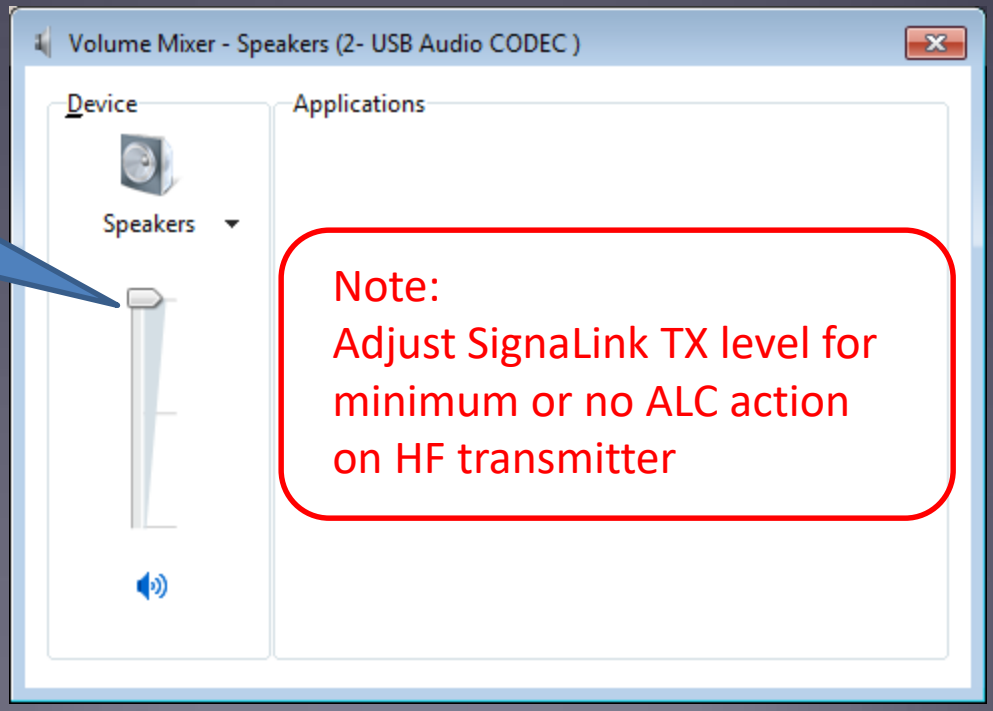
Resources Needed for Winlink Express

HF Winmor/ARDOP/VARA

- Same computer and software requirements as V/UHF Packet. Winmor and ARDOP modems are included with Winlink Express.
- ITSHF propagation prediction program. Note, you will be prompted to download this on first Winmor run. A link to the software will be provided.
- HF radio with data (sound) port and optionally computer control (CI/V, CAT, etc. for rig control).
- SignaLink or similar soundcard interface, may be built-in on newer HF radios.
- All software is free, donation is suggested.

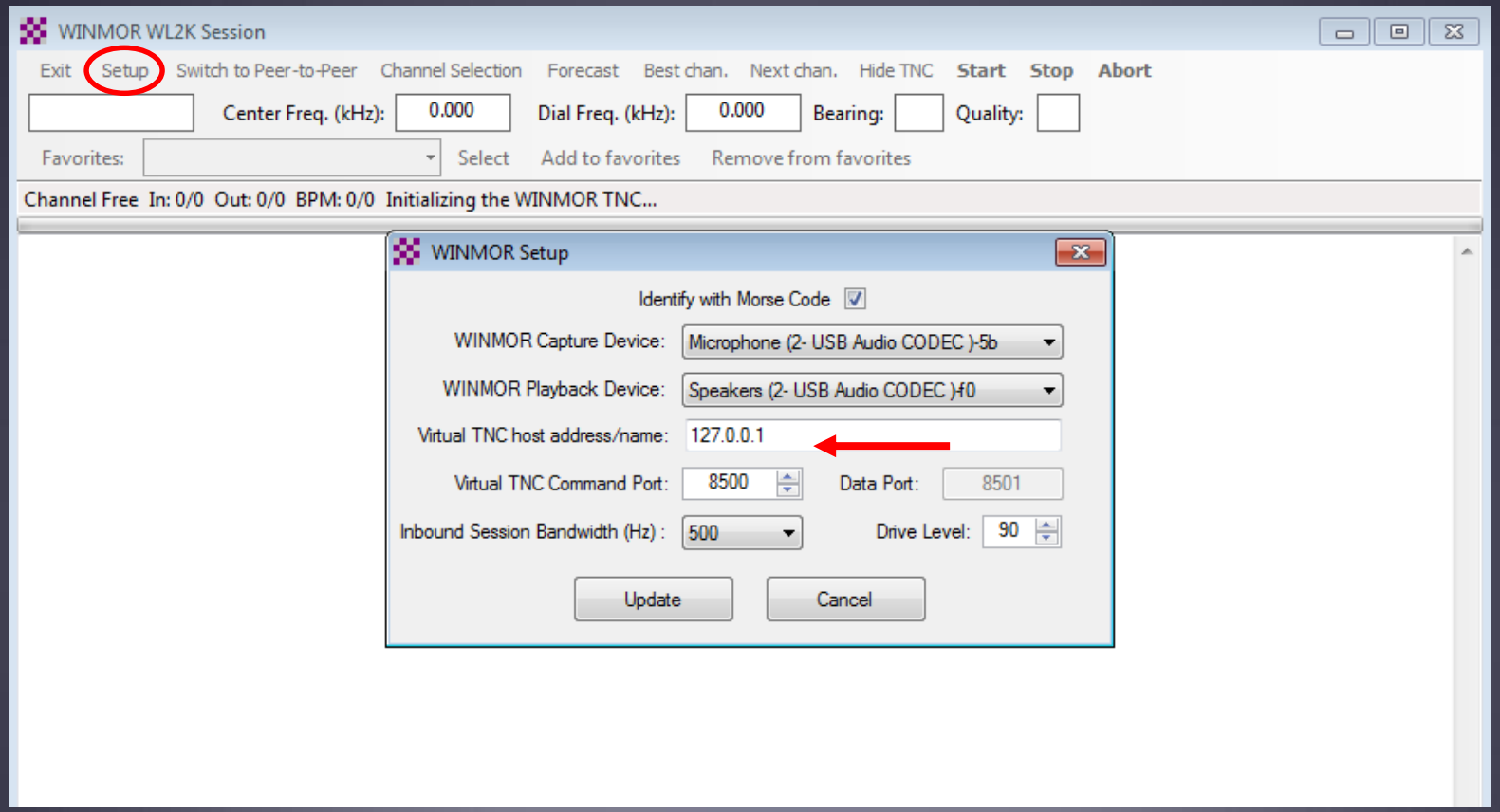
Configuring Sound Levels

Watch drive/ALC levels on transmitter



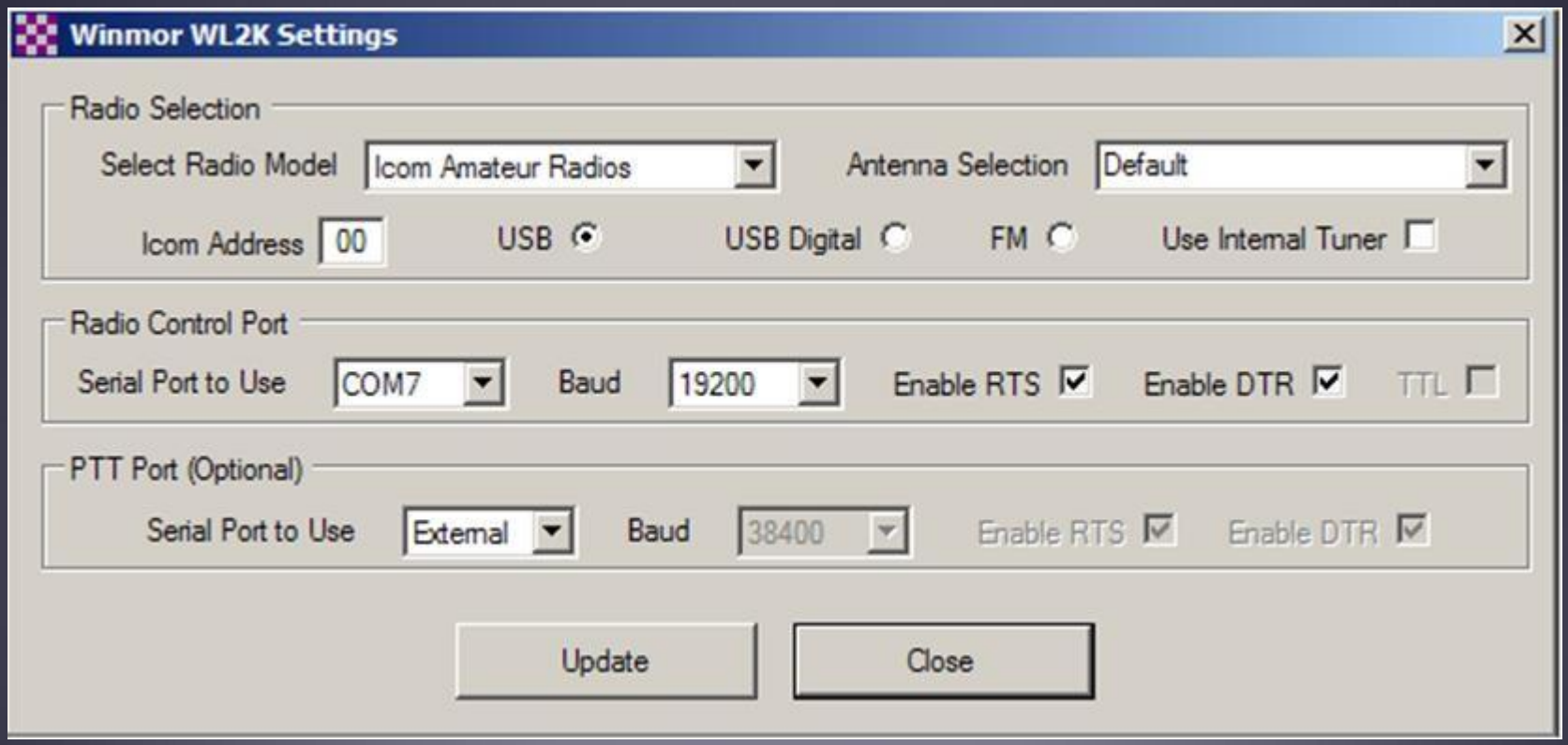
Initial Winmor/ARDOP Setup

Selecting the Audio Device



Winmor/ARDOP Radio Setup

Rig Control Parameters

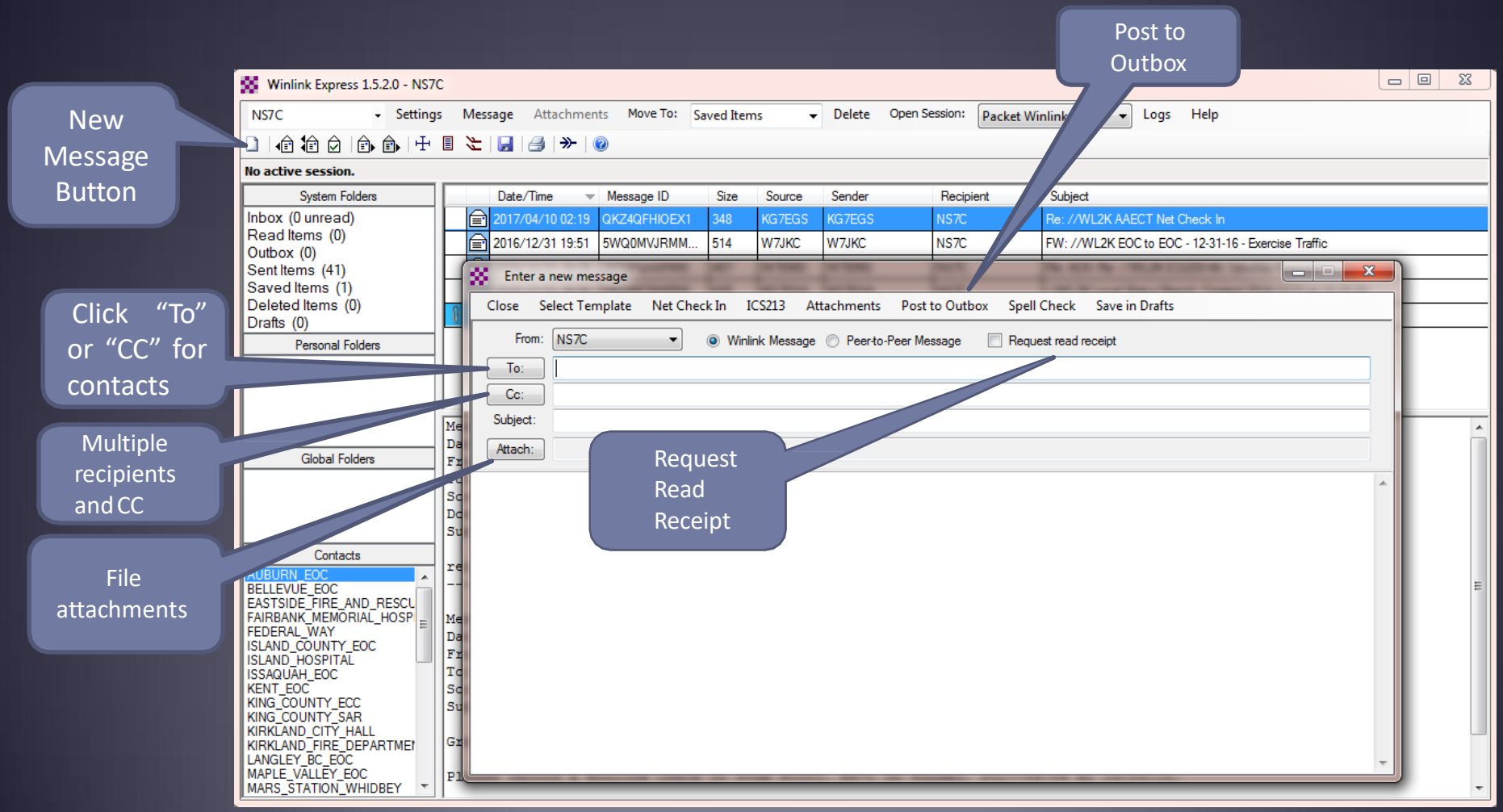


Winmor/ARDOP Radio Setup

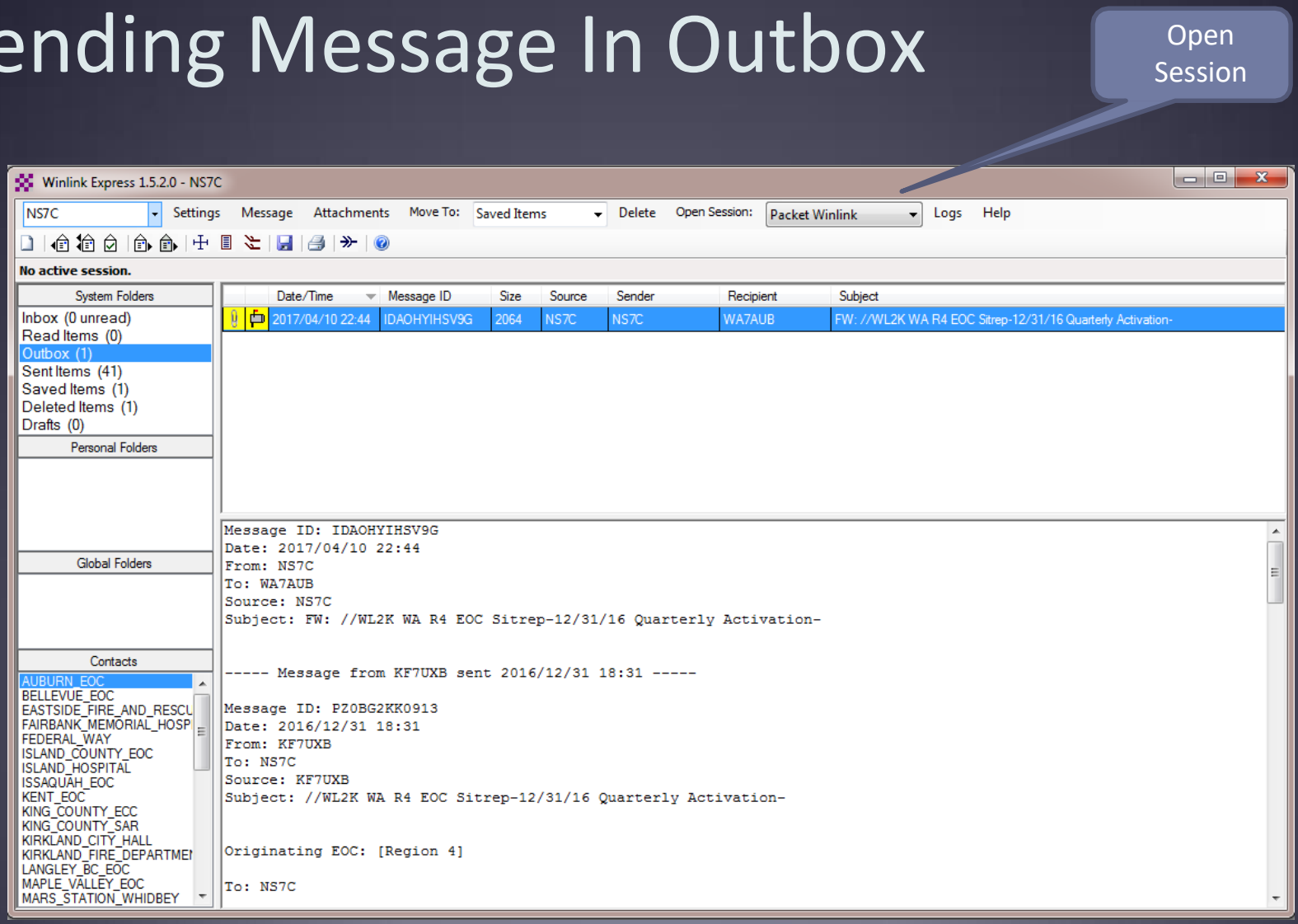
Adjust TX level for minimum ALC action

Changing frequencies/bands may require level changes too

Composing A Message

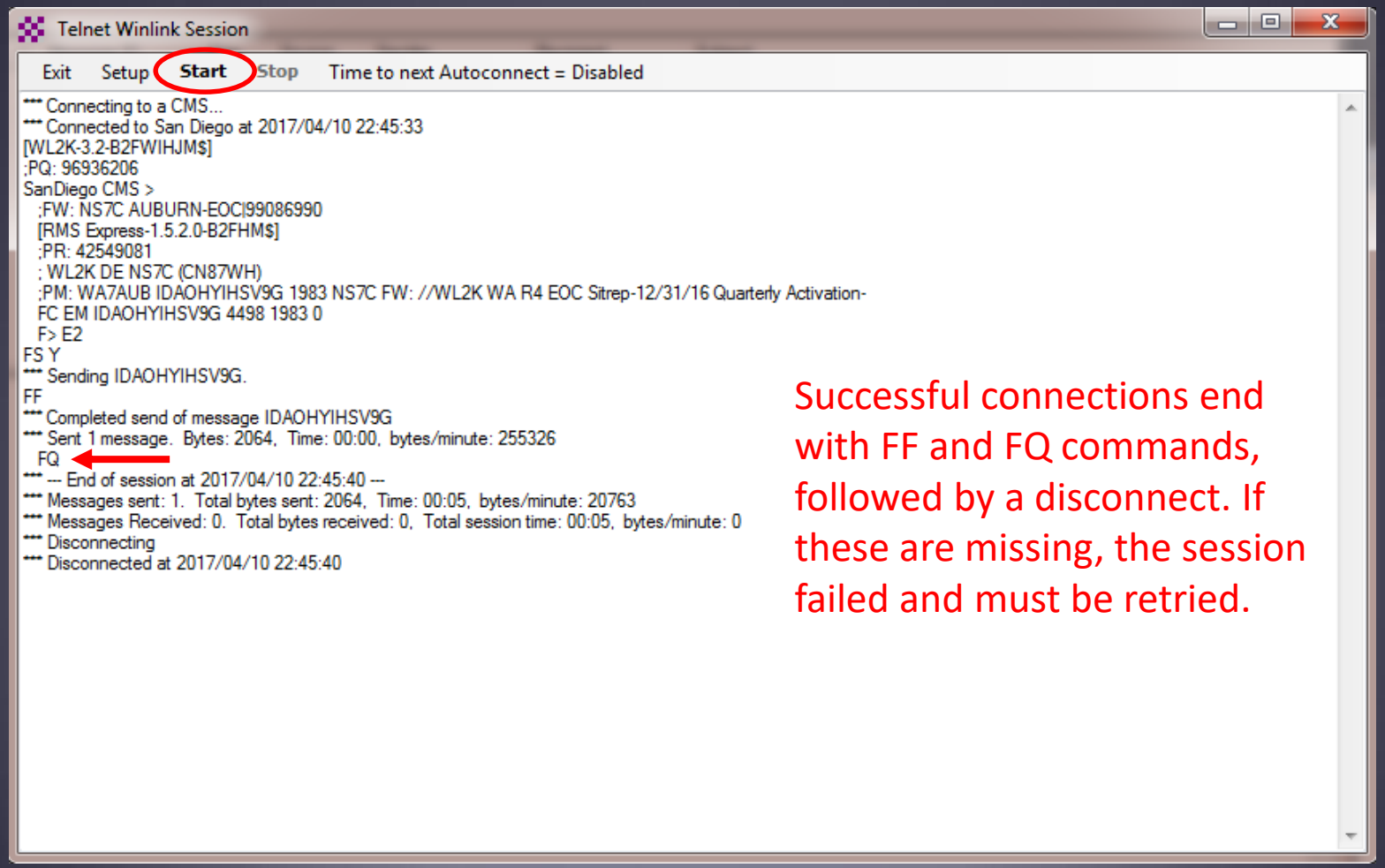


Pending Message In Outbox



Telnet Session

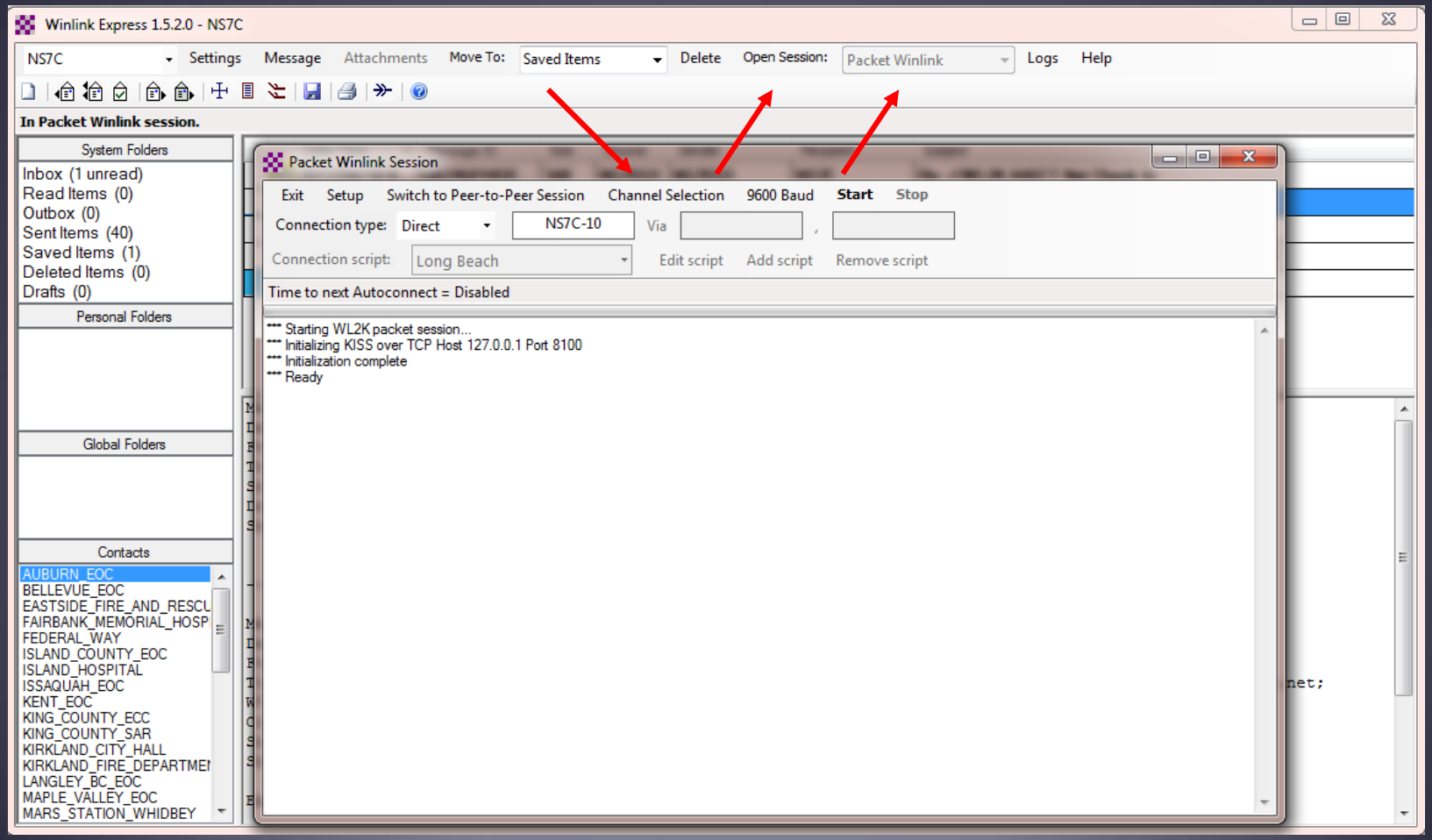
Connect, login, send message, log off



Successful connections end with FF and FQ commands, followed by a disconnect. If these are missing, the session failed and must be retried.

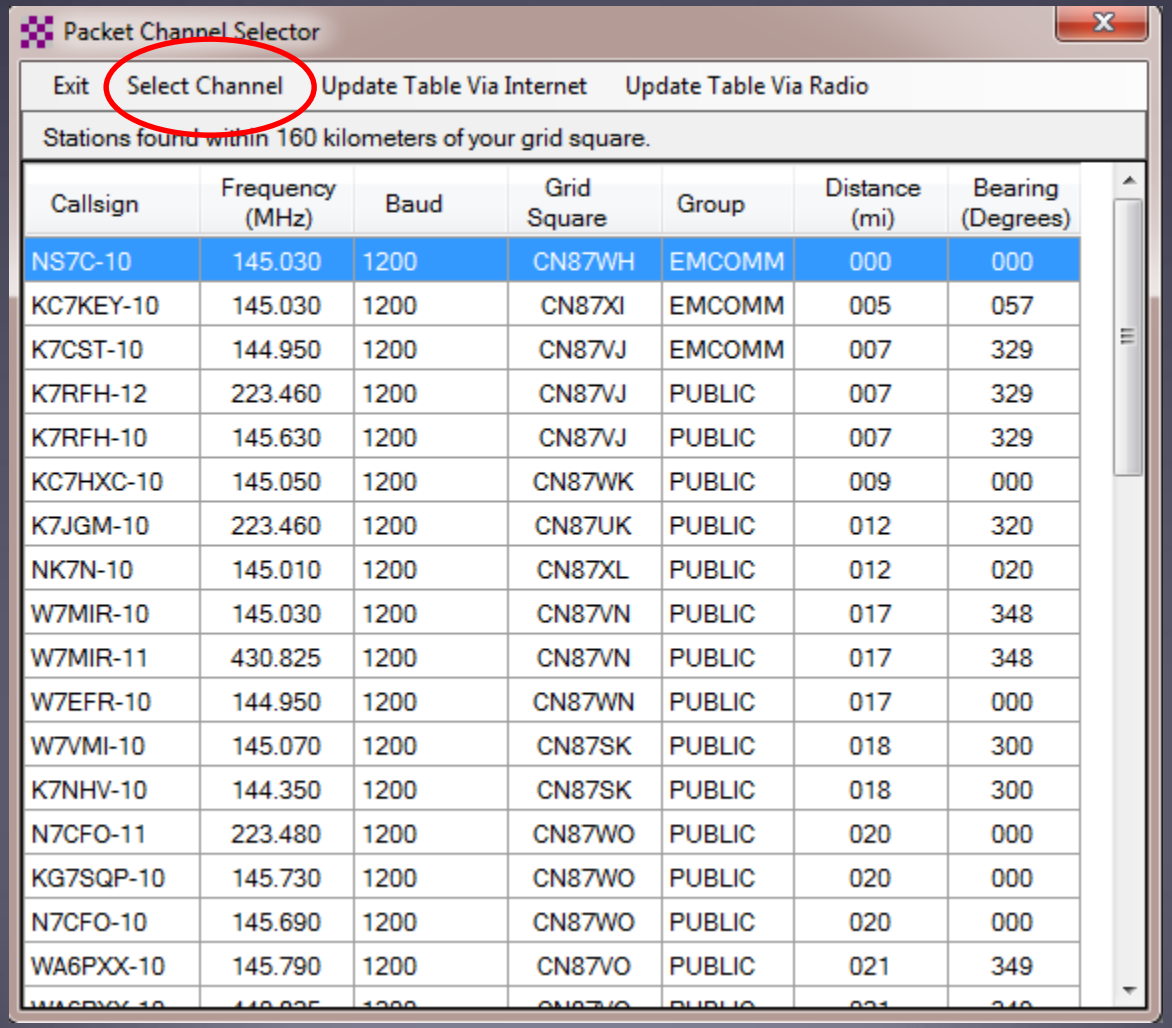
Packet Radio Session

Select Mode and Open Session



Packet Channel Selection

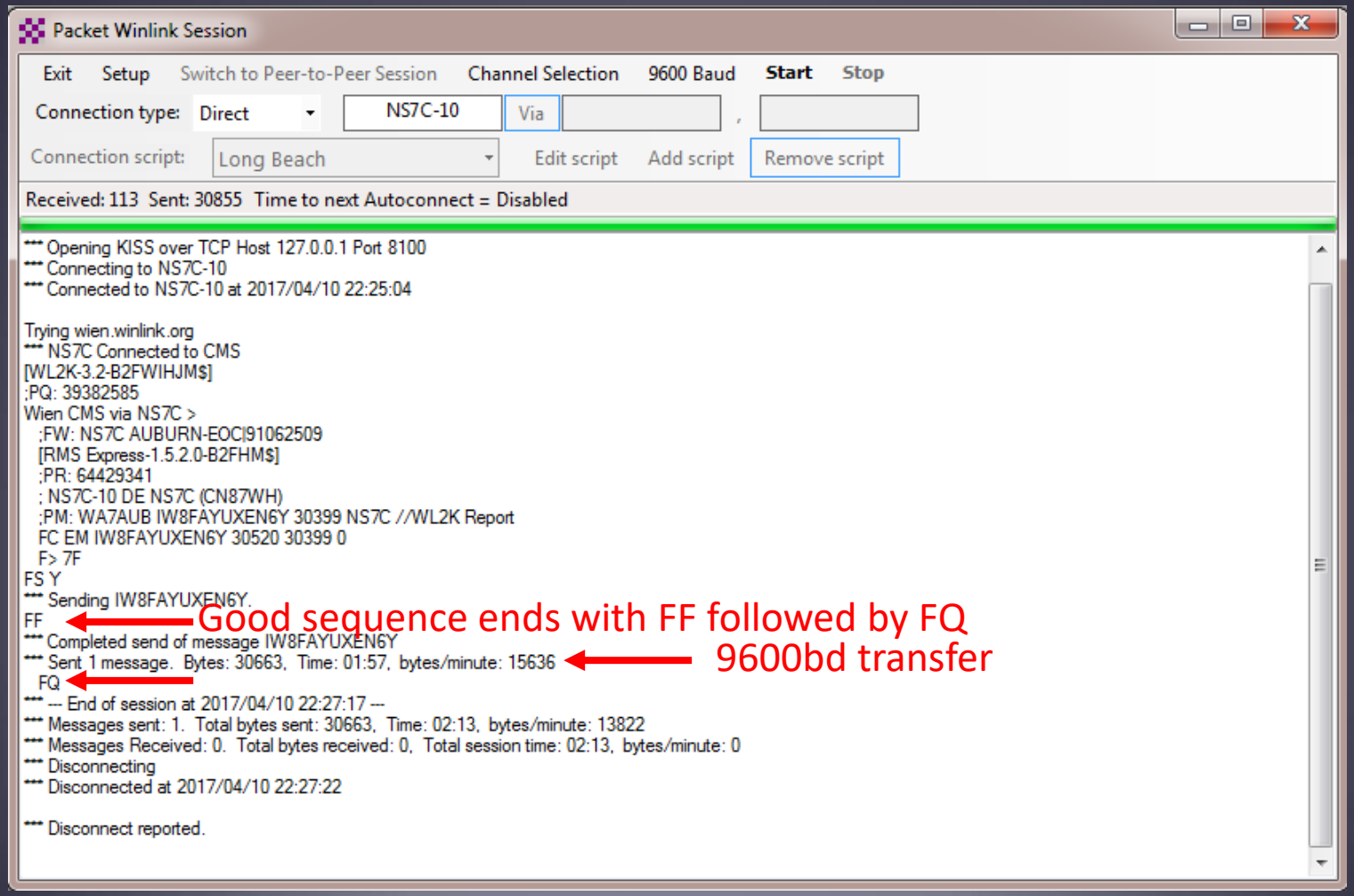
Based on your grid square



Callsign	Frequency (MHz)	Baud	Grid Square	Group	Distance (mi)	Bearing (Degrees)
NS7C-10	145.030	1200	CN87WH	EMCOMM	000	000
KC7KEY-10	145.030	1200	CN87XI	EMCOMM	005	057
K7CST-10	144.950	1200	CN87VJ	EMCOMM	007	329
K7RFH-12	223.460	1200	CN87VJ	PUBLIC	007	329
K7RFH-10	145.630	1200	CN87VJ	PUBLIC	007	329
KC7HXC-10	145.050	1200	CN87WK	PUBLIC	009	000
K7JGM-10	223.460	1200	CN87UK	PUBLIC	012	320
NK7N-10	145.010	1200	CN87XL	PUBLIC	012	020
W7MIR-10	145.030	1200	CN87VN	PUBLIC	017	348
W7MIR-11	430.825	1200	CN87VN	PUBLIC	017	348
W7EFR-10	144.950	1200	CN87WN	PUBLIC	017	000
W7VMI-10	145.070	1200	CN87SK	PUBLIC	018	300
K7NHV-10	144.350	1200	CN87SK	PUBLIC	018	300
N7CFO-11	223.480	1200	CN87WO	PUBLIC	020	000
KG7SQP-10	145.730	1200	CN87WO	PUBLIC	020	000
N7CFO-10	145.690	1200	CN87WO	PUBLIC	020	000
WA6PXX-10	145.790	1200	CN87VO	PUBLIC	021	349

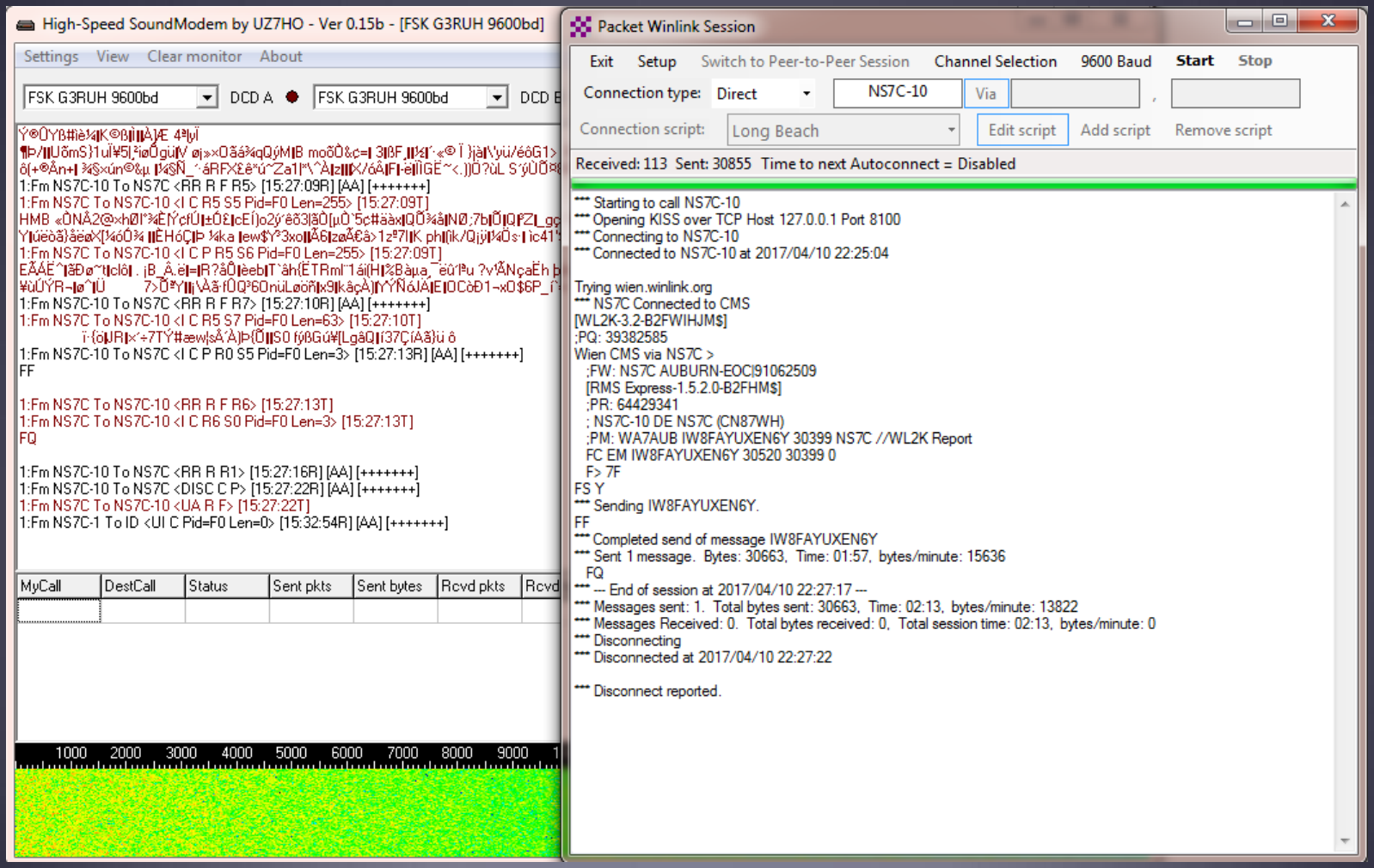
Packet Session (TNC)

Connect, login, send message, log off

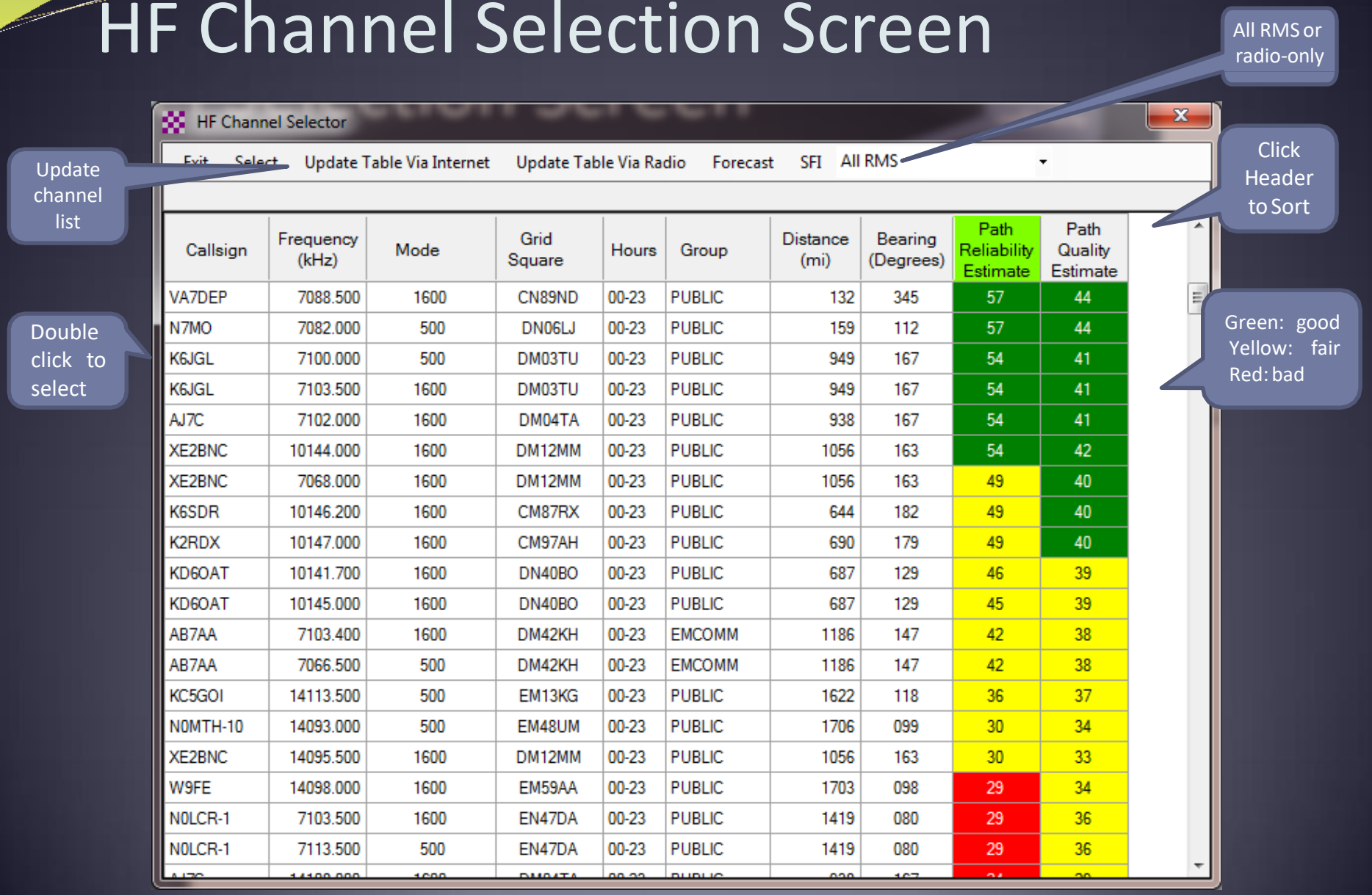


Packet Session (sound card)

Connect, login, check for message, log off

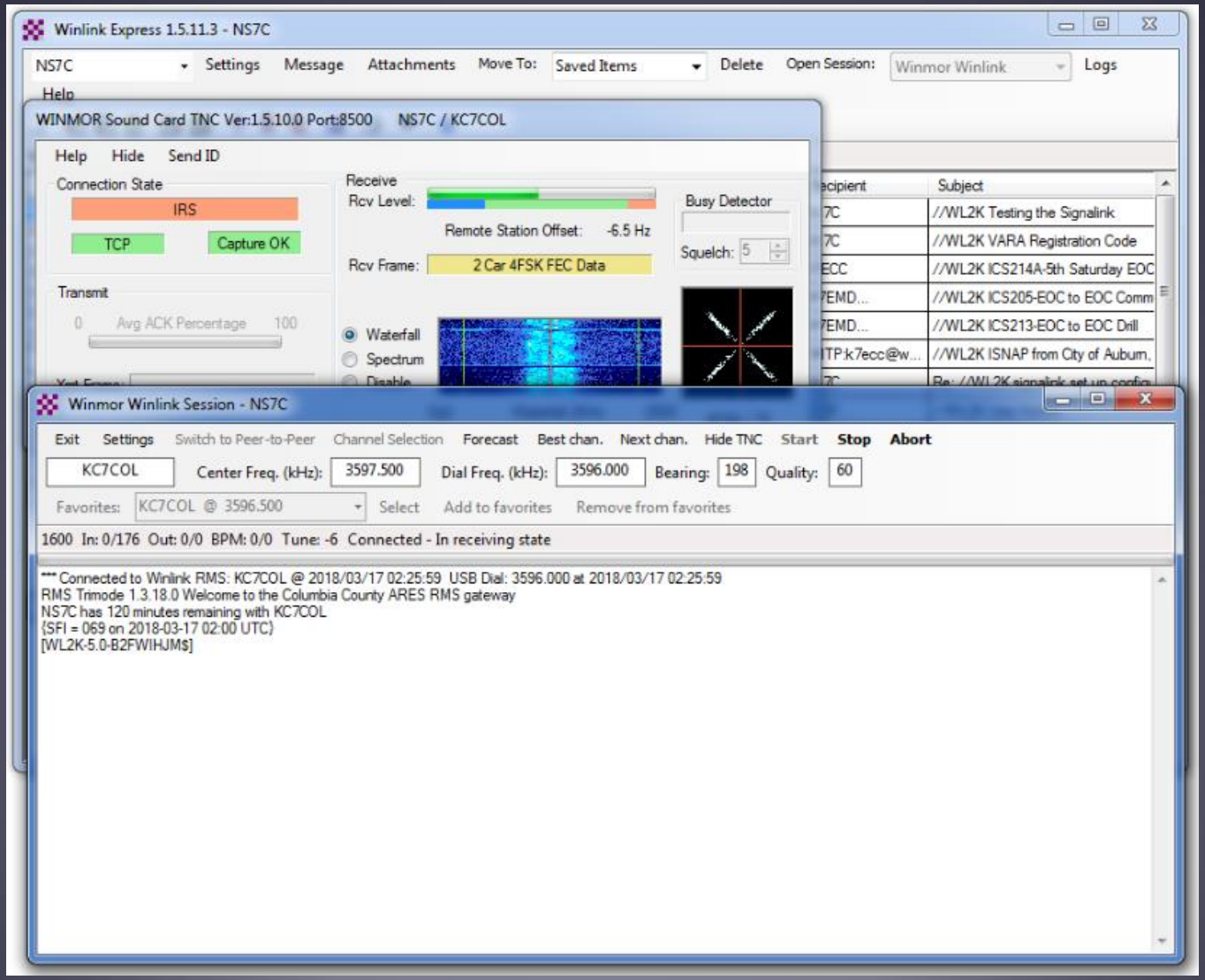


HF Channel Selection Screen

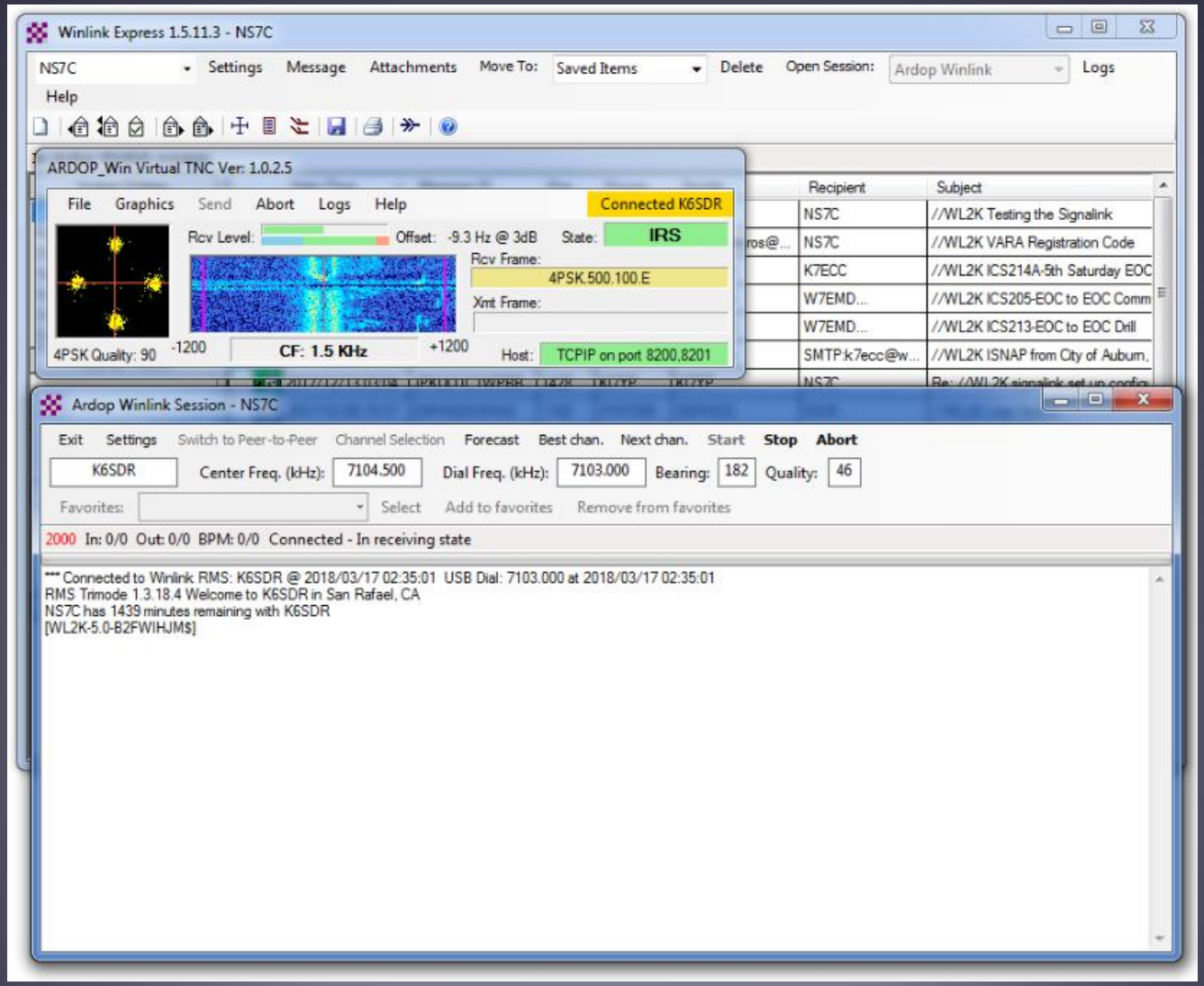


Callsign	Frequency (kHz)	Mode	Grid Square	Hours	Group	Distance (mi)	Bearing (Degrees)	Path Reliability Estimate	Path Quality Estimate
VA7DEP	7088.500	1600	CN89ND	00-23	PUBLIC	132	345	57	44
N7MO	7082.000	500	DN06LJ	00-23	PUBLIC	159	112	57	44
K6JGL	7100.000	500	DM03TU	00-23	PUBLIC	949	167	54	41
K6JGL	7103.500	1600	DM03TU	00-23	PUBLIC	949	167	54	41
AJ7C	7102.000	1600	DM04TA	00-23	PUBLIC	938	167	54	41
XE2BNC	10144.000	1600	DM12MM	00-23	PUBLIC	1056	163	54	42
XE2BNC	7068.000	1600	DM12MM	00-23	PUBLIC	1056	163	49	40
K6SDR	10146.200	1600	CM87RX	00-23	PUBLIC	644	182	49	40
K2RDX	10147.000	1600	CM97AH	00-23	PUBLIC	690	179	49	40
KD6OAT	10141.700	1600	DN40BO	00-23	PUBLIC	687	129	46	39
KD6OAT	10145.000	1600	DN40BO	00-23	PUBLIC	687	129	45	39
AB7AA	7103.400	1600	DM42KH	00-23	EMCOMM	1186	147	42	38
AB7AA	7066.500	500	DM42KH	00-23	EMCOMM	1186	147	42	38
KC5GOI	14113.500	500	EM13KG	00-23	PUBLIC	1622	118	36	37
N0MTH-10	14093.000	500	EM48UM	00-23	PUBLIC	1706	099	30	34
XE2BNC	14095.500	1600	DM12MM	00-23	PUBLIC	1056	163	30	33
W9FE	14098.000	1600	EM59AA	00-23	PUBLIC	1703	098	29	34
N0LCR-1	7103.500	1600	EN47DA	00-23	PUBLIC	1419	080	29	36
N0LCR-1	7113.500	500	EN47DA	00-23	PUBLIC	1419	080	29	36

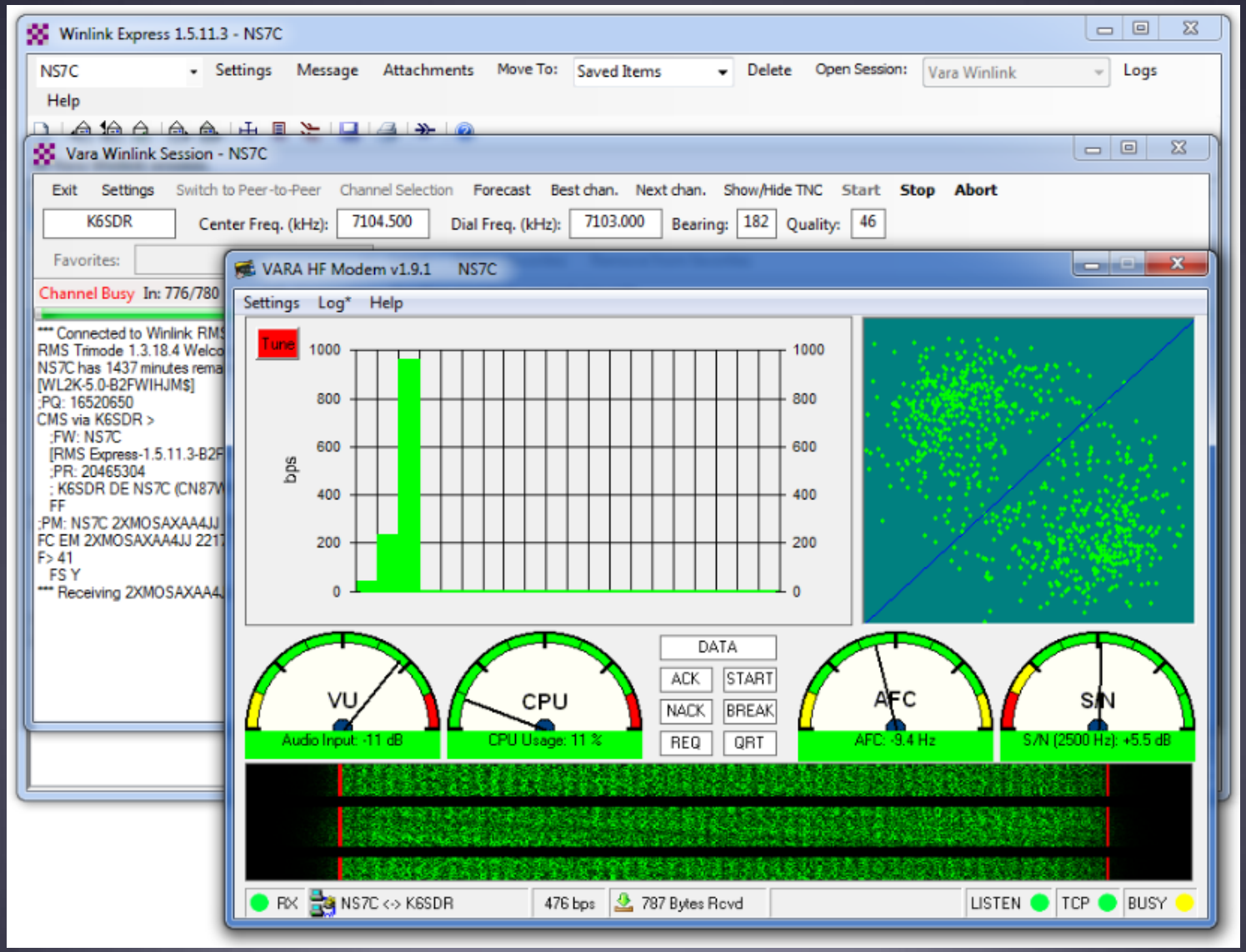
WINMOR HF Session



ARDOP HF Session

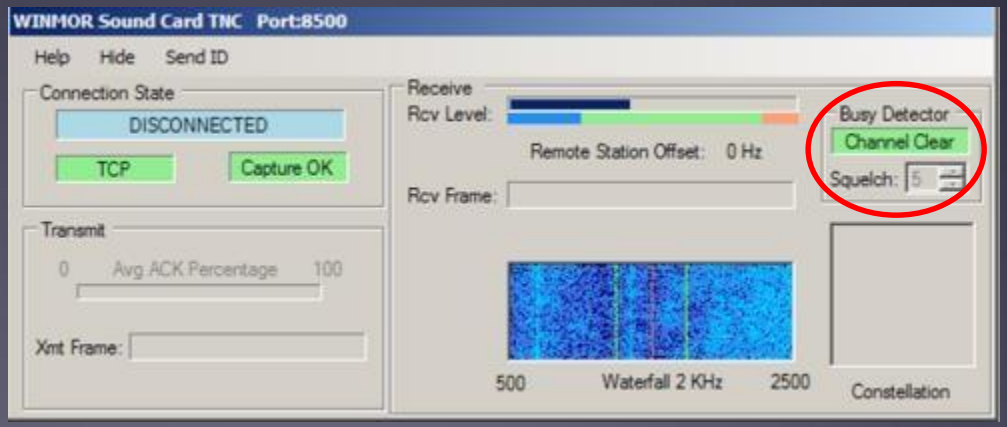


Vara HF Session

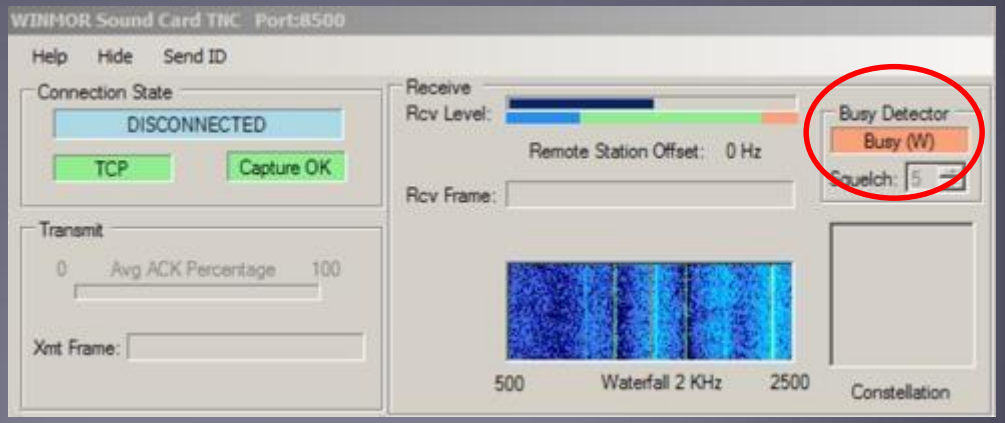


Check If Channel Is Free

Free Channel:

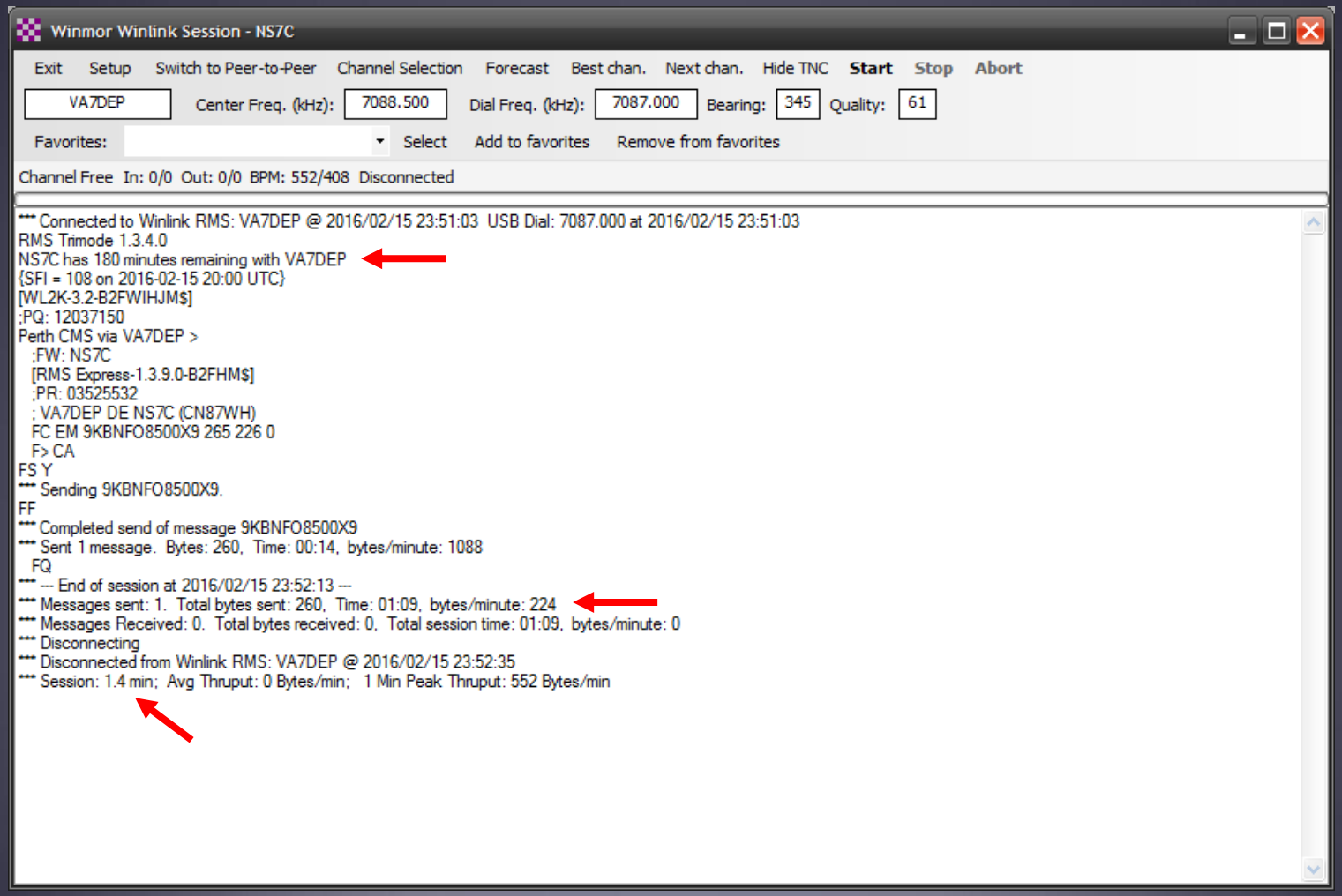


Busy Channel:



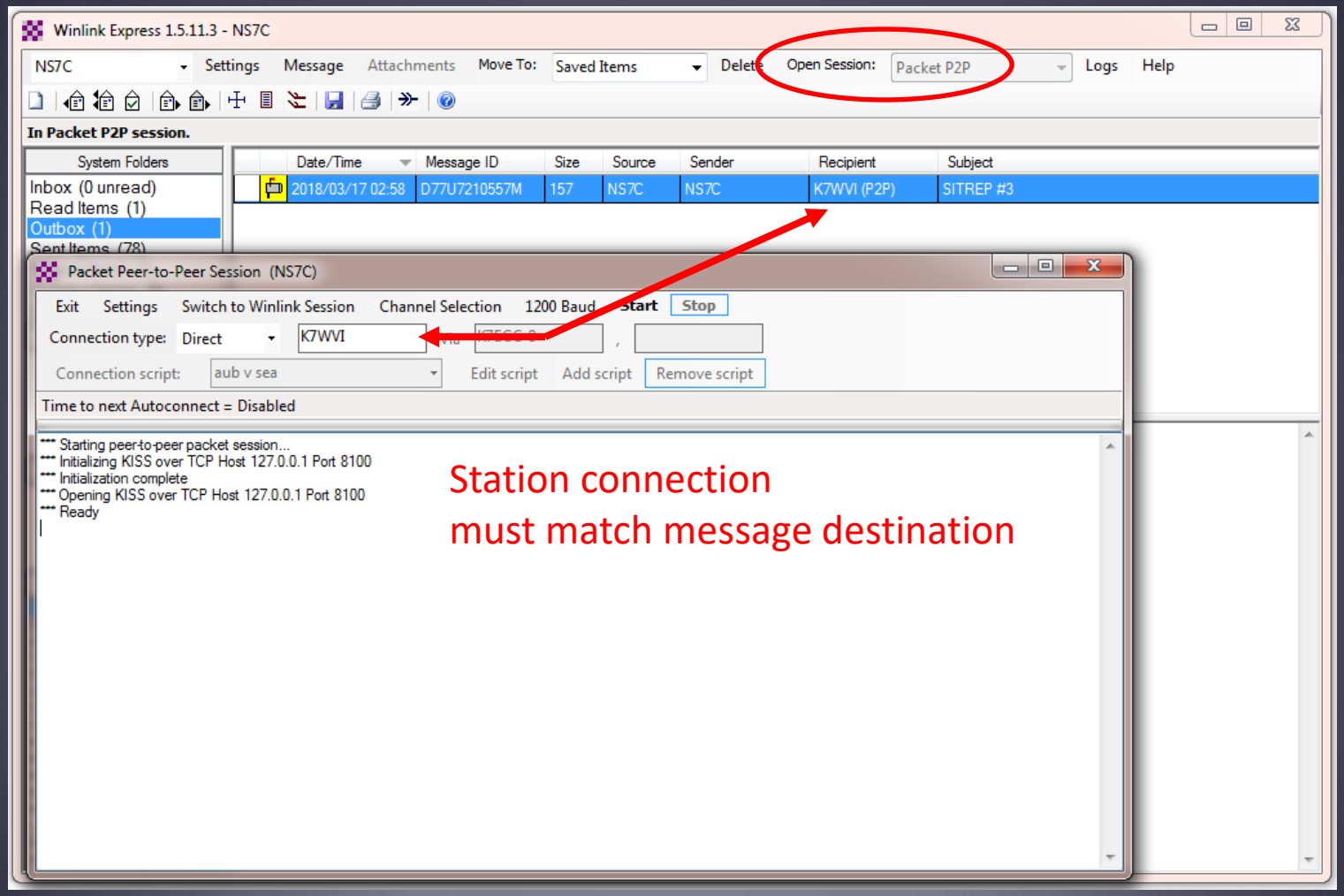
Winmor Session Log

Connect, login, send message, log off



Packet P2P Session

Connect, send/receive messages, disconnect



Winlink Express HTML Forms

- HTML forms are efficient and professional looking.
- Forms can be simple or very complex.
- Forms can look as good as any web site.
- Forms are easy to use.
- Attractive forms are difficult to create unless you understand HTML, cascading style sheets and JavaScript.
- The Winlink team is building a library of forms.
- We need good HTML/JavaScript programmers.

HTML Form and Template Set

- A full form set has three components:
  - A template that displays the form and generates the text message to be sent.
  - An input form that solicits input from the user.
  - A display form that formats and displays the information on the recipient's computer.
- The form itself is not transmitted, only the data entered on the form.
- Forms may be very complex and feature rich, but the actual data transmitted is very compact.
- Receiving station must have the display form installed for proper display, but they will still receive a text-only version.

Winlink Express Forms

ICS form for data entry in browser

Tracking # 123 (Optional) **GENERAL MESSAGE** ICS213 RMSE Vers 2.36

1. Incident Name: Big Fire

2. To (Name / Position): Ops Chief, KCECC

3. From (Name / Position): Ops Chief, Auburn EOC

4. Subject: Status Update 5./6. Date / Time: 2016-03-21 08:44:43

7. Message:

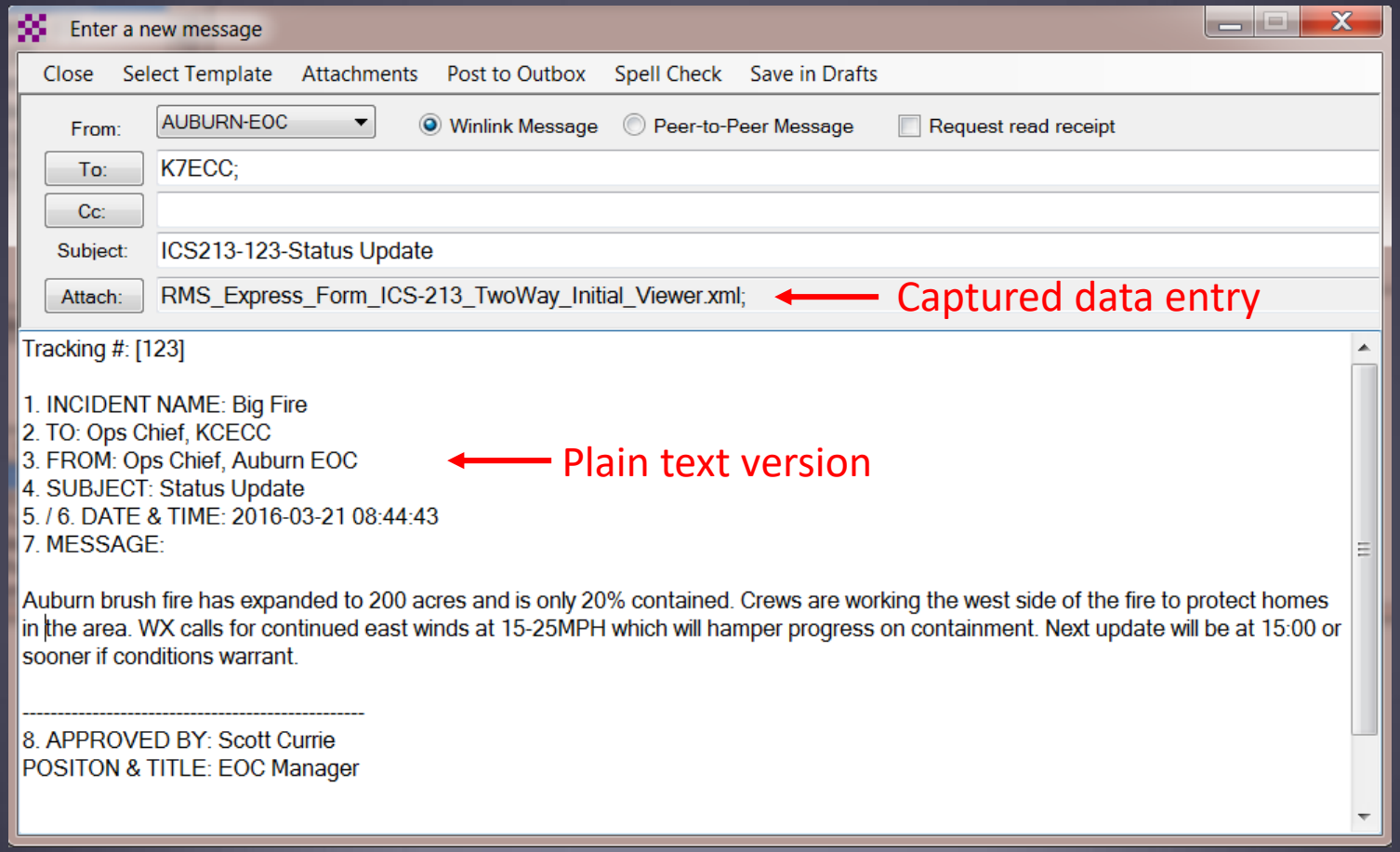
Auburn brush fire has expanded to 200 acres and is only 20% contained. Crews are working the west side of the fire to protect homes in the area. WX calls for continued east winds at 15-25MPH which will hamper progress on containment. Next update will be at 15:00 or sooner if conditions warrant.

8. Approved by: Scott Currie Position / Title: EOC Manager

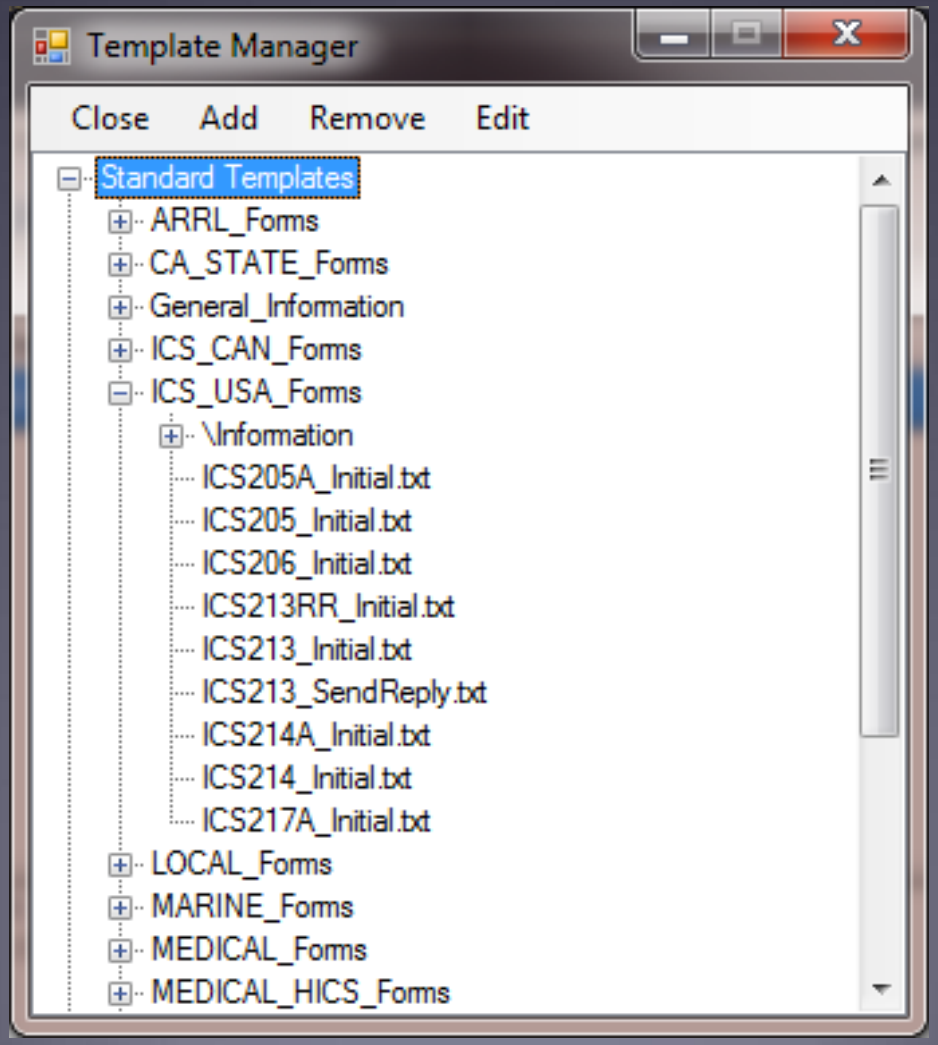
Submit

Winlink Express Forms

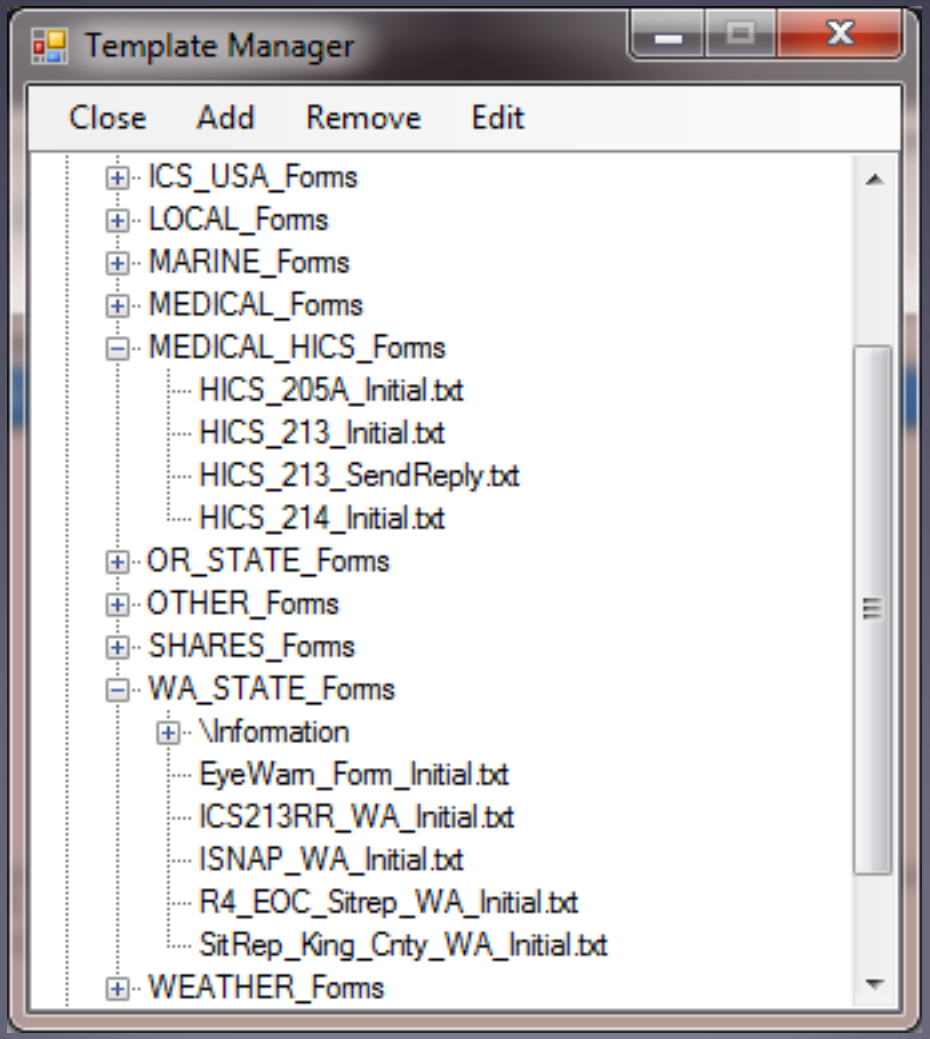
Completed form ready to send



Available Winlink Express Forms (ICS)



Available Winlink Express Forms (general)

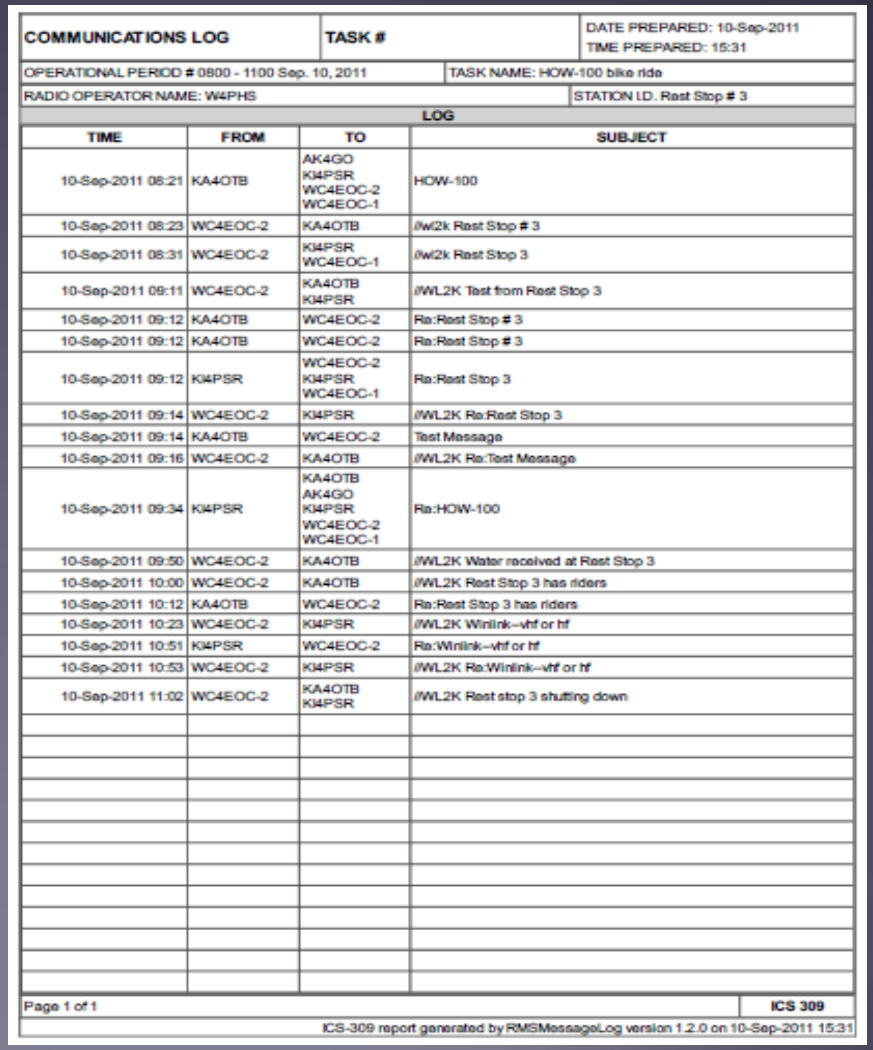


Available Winlink Express Forms

- A full set of standard forms are included
  - Installed with the application
  - Maintained by WDT
  - Updates are downloaded whenever Winlink Express is started (via Internet)
  - Forms can be requested via radio
- Locally developed forms must be maintained by users
  - If there are enough users, local forms can be added to the distribution

Generated ICS-309 PDF Message Log Report

This is a separate application provided by the WDT, and must be downloaded and installed



COMMUNICATIONS LOG	TASK #	DATE PREPARED: 10-Sep-2011 TIME PREPARED: 15:31
OPERATIONAL PERIOD # 0800 - 1100 Sep. 10, 2011	TASK NAME: HOW-100 bike ride	
RADIO OPERATOR NAME: W4PHS	STATION I.D. Rest Stop # 3	

LOG

TIME	FROM	TO	SUBJECT
10-Sep-2011 08:21	KA4OTB	AK4GO KI4PSR WC4EOC-2 WC4EOC-1	HOW-100
10-Sep-2011 08:23	WC4EOC-2	KA4OTB	//wl2k Rest Stop # 3
10-Sep-2011 08:31	WC4EOC-2	KI4PSR WC4EOC-1	//wl2k Rest Stop 3
10-Sep-2011 09:11	WC4EOC-2	KA4OTB KI4PSR	//WL2K Test from Rest Stop 3
10-Sep-2011 09:12	KA4OTB	WC4EOC-2	Re:Rest Stop # 3
10-Sep-2011 09:12	KA4OTB	WC4EOC-2	Re:Rest Stop # 3
10-Sep-2011 09:12	KI4PSR	WC4EOC-2 KI4PSR WC4EOC-1	Re:Rest Stop 3
10-Sep-2011 09:14	WC4EOC-2	KI4PSR	//WL2K Re:Rest Stop 3
10-Sep-2011 09:14	KA4OTB	WC4EOC-2	Test Message
10-Sep-2011 09:16	WC4EOC-2	KA4OTB	//WL2K Re:Test Message
10-Sep-2011 09:34	KI4PSR	KA4OTB AK4GO KI4PSR WC4EOC-2 WC4EOC-1	Re:HOW-100
10-Sep-2011 09:50	WC4EOC-2	KA4OTB	//WL2K Water received at Rest Stop 3
10-Sep-2011 10:00	WC4EOC-2	KA4OTB	//WL2K Rest Stop 3 has riders
10-Sep-2011 10:12	KA4OTB	WC4EOC-2	Re:Rest Stop 3 has riders
10-Sep-2011 10:23	WC4EOC-2	KI4PSR	//WL2K Winlink--vhf or hf
10-Sep-2011 10:51	KI4PSR	WC4EOC-2	Re:Winlink--vhf or hf
10-Sep-2011 10:53	WC4EOC-2	KI4PSR	//WL2K Re:Winlink--vhf or hf
10-Sep-2011 11:02	WC4EOC-2	KA4OTB KI4PSR	//WL2K Rest stop 3 shutting down

Page 1 of 1 ICS 309

ICS-309 report generated by RMSMessageLog version 1.2.0 on 10-Sep-2011 15:31

Conclusion

- Winlink Express use continues to grow, especially for EmComm.
- The Winlink Development Team continues to enhance capabilities to adapt to changing needs.
- Installation and set up is relatively easy.
- Familiar “e-mail” like interface.
- Supports multiple radio transfer modes.
- Support for both hardware and software interfaces.

Questions?