

# APRS – Direwolf - Xastir

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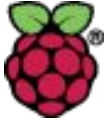


# APRS – Direwolf - Xastir

- This session will consists of three parts
  - Overview of an **APRS** capability
  - **Direwolf** installation and configuration
  - **Xastir** installation and configuration and usage



# Overview of APRS Capability



# APRS

## (Automated Packet Reporting System)

- Send and Receive “Packets”
- Packets may contain
  - Call Sign
  - Position information
  - Messages (similar to text message)
  - Weather Reports
  - Telemetry information



Internet

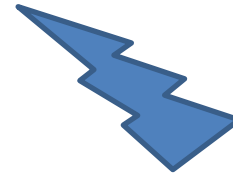
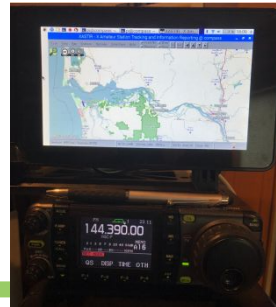
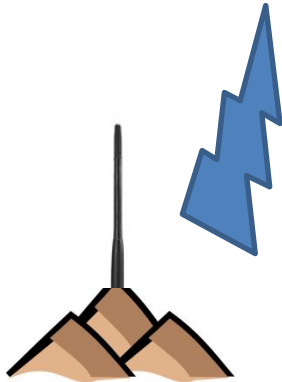
IGate

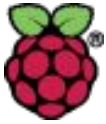
**APRS Packets Containing  
Position Reports, Messages, Status,  
Weather Reports, Telemetry**

DigiPeater

River Gauge

Cell Phone





# APRS on a Yaesu VX-8DR

Many mobile radios when connected to a GPS can send packets with position information



STATION LIST		5/50
1	E W6QRZ - 7	10:03
2	W WB6QRZ	10:00
3	P W6QSP - 7	09:55

STATION LIST CHARACTER

DIRECTION TO THE RECEIVED STATION

STATION LIST CHARACTER

STATUS TEXT "FLAG"

	W6QRZ - 7	
	Mic-E	12/31
	3.2mi	10:03
	Speed	32mph

RECEIVED DATE & TIME

DISTANCE TO THE RECEIVED STATION

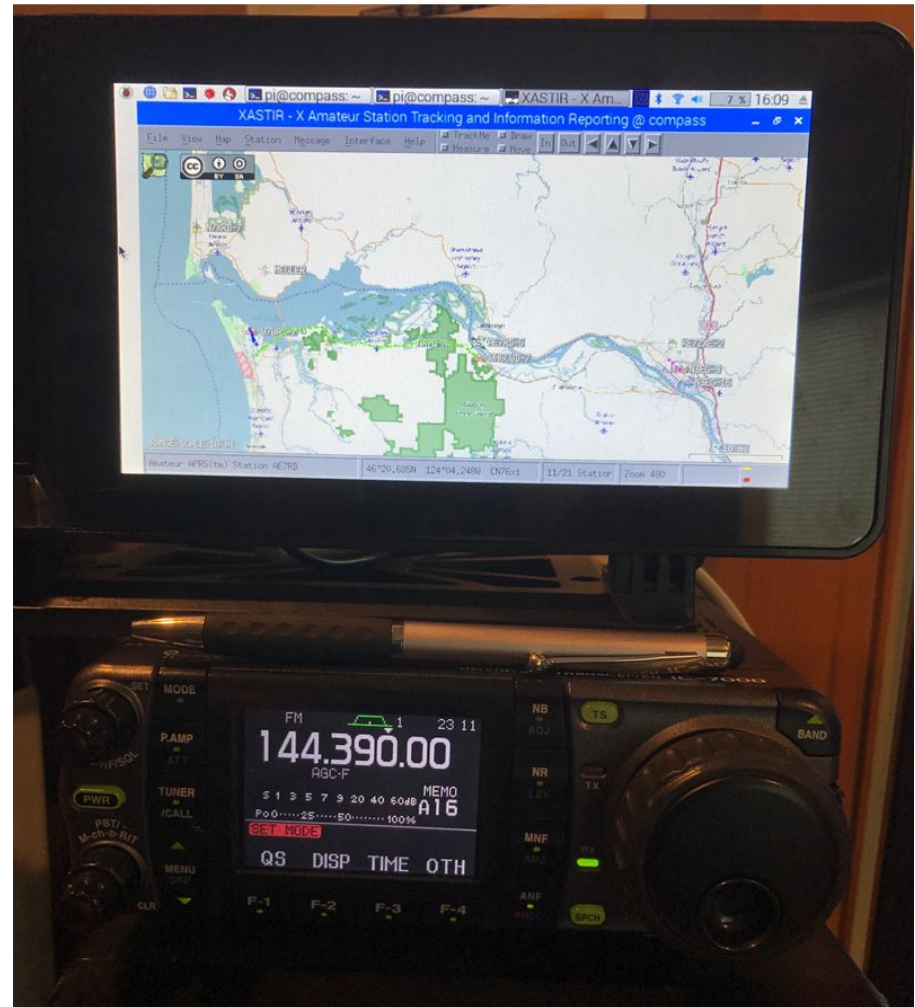
APRS MESSAGE		6/30
1	RX W6QRZ - 7	10:03
2	RX WB6QRZ	10:00
3	RX W6QSP - 7	09:55

RX	W6QRZ - 7	12/31
MSG:	11	10:03
Hello!.....		
.....		

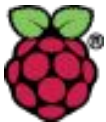


# APRS with a RPi and ICOM7000

Radios connected to a small computer or laptop and a GPS can send and receive APRS Packets and display stations on a map. If the computer has a keyboard, messages can be easily typed as well.

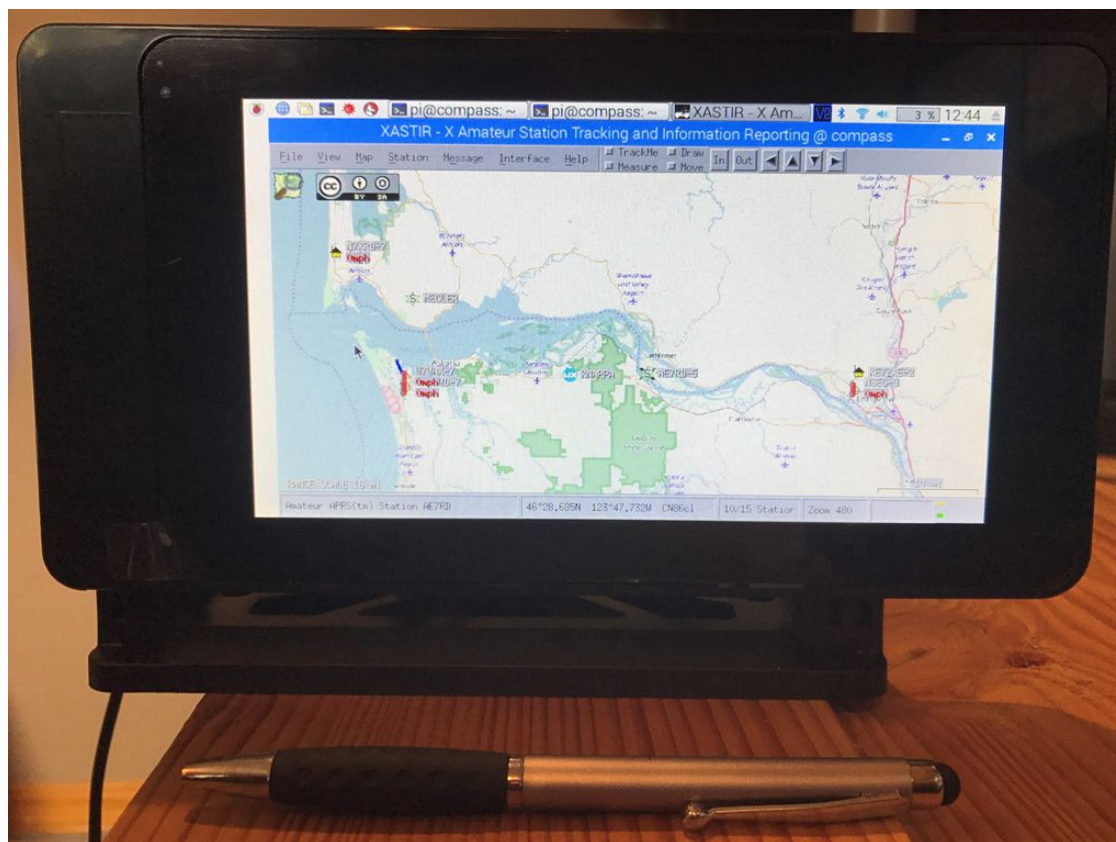






# Raspberry Pi – Direwolf - Xastir

- Raspberry Pi – Compass Image
- UDRC II Sound Card
- Running Direwolf for TNC Functionality
- Running Xastir for APRS Display
- PI/Direwolf Can Also be a “Network Server” to other APRS applications on the network.

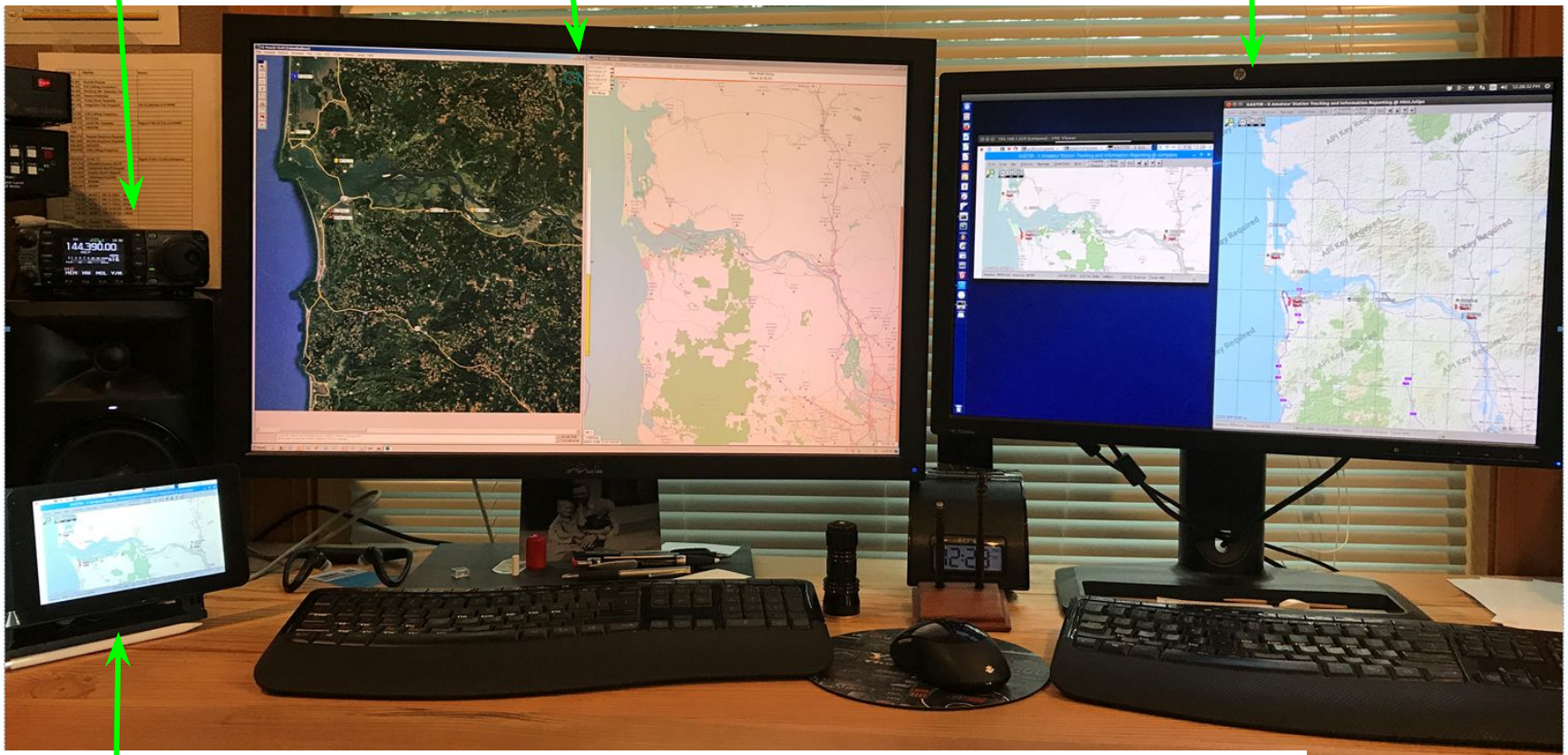




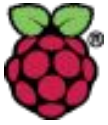
Windows 7  
UI-View32 on Left  
APRSIS32 on Right

Ubuntu Linux  
VNC Viewer of PI Desktop On Left  
Xastir on Right

ICOM 7000



Raspberry Pi – Running Direwolf and Xastir and providing APRS services via the network to both the Windows and Linux Machines



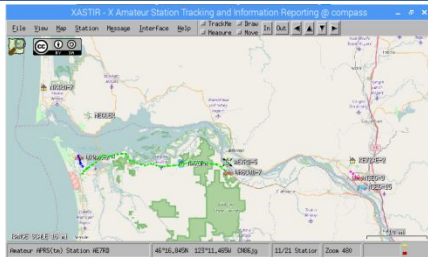
# Xastir – Direwolf – Sound Card – Radio

## Raspberry Pi Computer and Display

Direwolf – Decodes & Encodes digital audio from/to sound card and makes data available to external applications

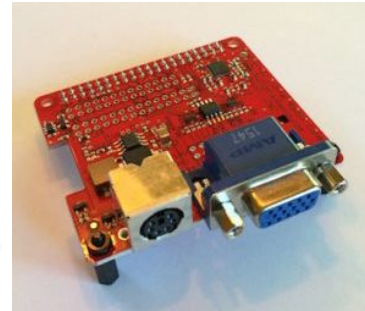
Network Port

XASTIR – Displays APRS Packet Information on Map



USB

Direct Connection



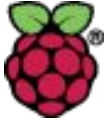
UDRC-II or Signalink Sound Card

6-Pin Cable



Radio





# Direwolf

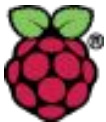
## Installation and Configuration





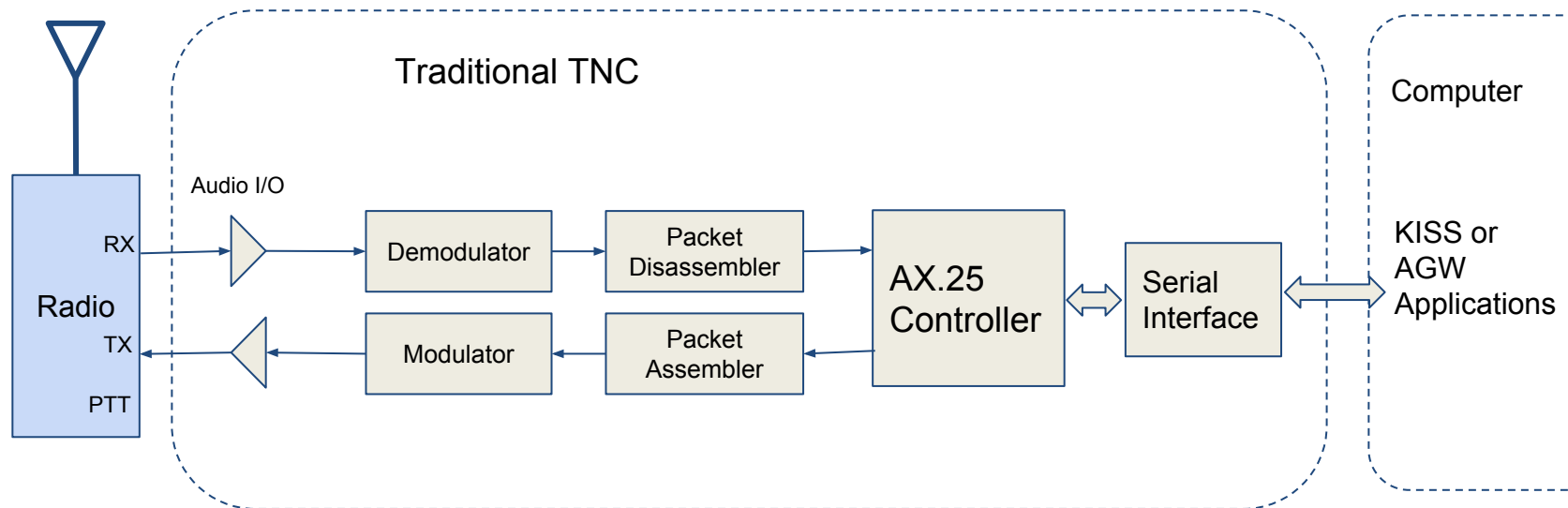
# Goals of this Presentation

- Provide an overview of Direwolf and software TNCs
- Show how to do a manual install of direwolf
- Show how to start and stop direwolf when run as a daemon
- Show how to run direwolf from the command line
- Explain the configuration file format and a basic configuration
- Explain how to debug and test your direwolf configuration
- Demonstrate how to adjust the audio levels
- Show how Winlink Express on a PC can use your Pi as a TNC
- Provide references for additional information



# What is a TNC?

A terminal node controller (**TNC**) is a device used by amateur radio operators to participate in AX.25 packet radio networks. It includes Packet Assembler/Disassemblers and a modem to convert baseband digital signals to audio tones.





# What is Direwolf?

**direwolf** is a software "soundcard" TNC and APRS encoder/decoder which:

- provides a virtual TNC for other applications\*
- displays APRS messages, and generates APRS beacons
- acts as a digipeater, APRStt gateway, or Internet Gateway (IGate)
- supports KISS & AGWPE interfaces over TCP and virtual serial ports

\* For example: Linux AX25 implementation, PacLink, APRSIS32, UI-View32, Xastir, APRS-TW, YAAC, UISS, SARTrack, Winlink Express, and others.



# Direwolf - History and Status

Developed starting in 2011 by John Langner (WB2OSZ)

First major release in 2014. Current release 1.4 (April 2017).

Open source software, actively maintained, developed and documented

Ported to Windows, MacOS, and Linux (both x86 and ARM)

Recent changes:

- Added 2400 & 4800 bps PSK modems
- Top speed of increased from 9600 to 38400. (w/appropriate sound card)
- Better decoder performance for 9600+
- AX.25 v2.2 connected mode
- Improved GPS device support ... and lots of bug fixes!





# Direwolf - Resources

GitHub Project:

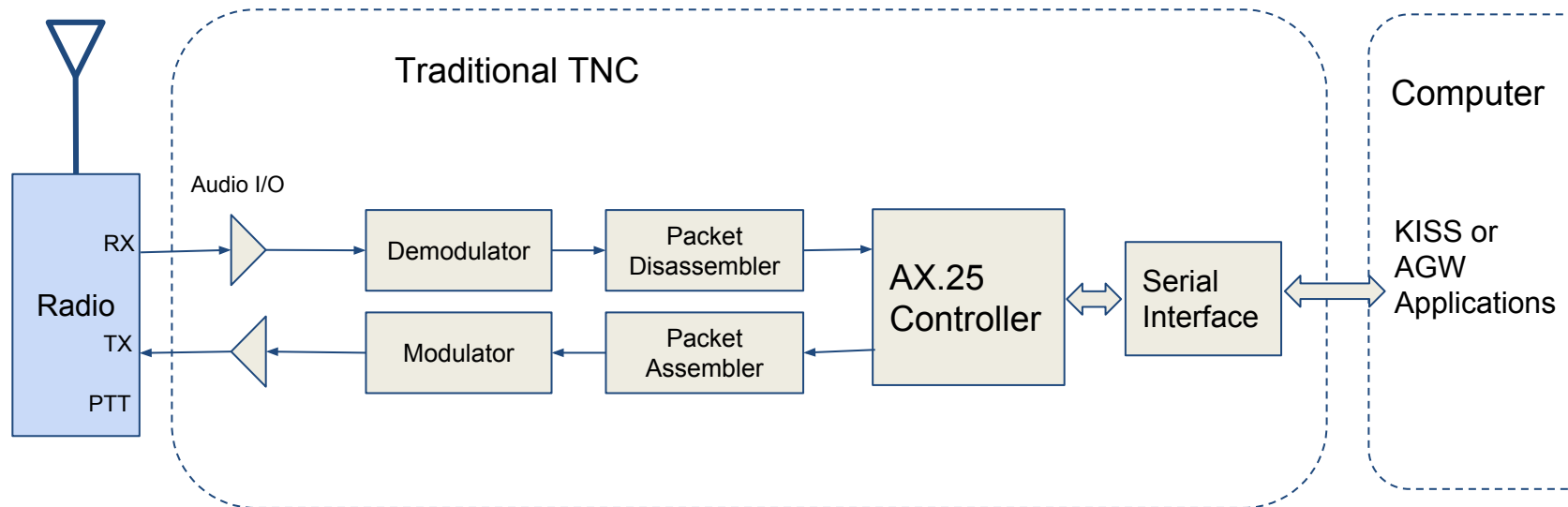
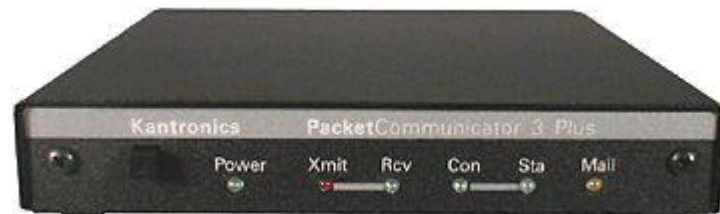
<https://github.com/wb2osz/direwolf>

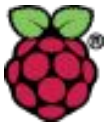
Dire Wolf User Guide (143 pages of detailed documentation)

<https://github.com/wb2osz/direwolf/blob/master/doc/User-Guide.pdf>



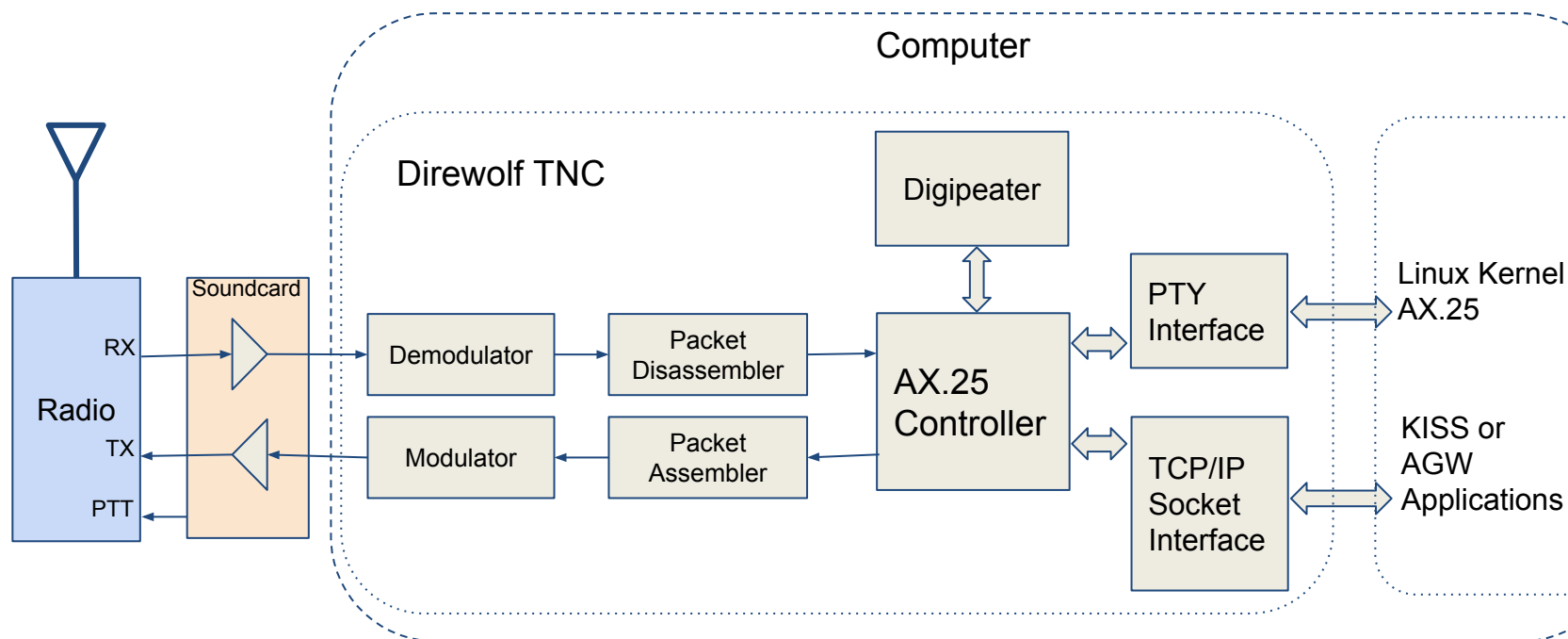
So this is our traditional TNC...

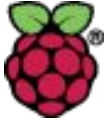




# Direwolf System Overview

Most of the TNC moves into the computer and it uses either the standard or an auxiliary audio interface to communicate to the radio.





# Installation (manual)

On Compass Linux:

```
cd  
sudo apt-get install direwolf  
nano direwolf.conf  
direwolf -c direwolf.conf
```

Issues:

- 1) not a daemon under systemd (does not start automatically)
- 2) you need to create a configuration manually

There is a better way - Basil's scripts ([n7nix/direwolf](https://github.com/n7nix/direwolf))



# Installation (scripts with systemd support)

Basil's scripts automate most of the installation for Direwolf and much more.

<https://github.com/nwdigitalradio/n7nix>

- enable ax25 support in the linux kernel
- build, install and configure the ax25 software
- check if direwolf is installed, and if not, build it from source
- create /etc/direwolf.conf
- check for udrc-II and create and run configuration script if needed (set-udrc-din6.sh)
- configure systemd to start direwolf at system bootup



# Operation: Starting/Stopping with systemd

```
# service direwolf stop
# service direwolf status
- direwolf.service - Direwolf Daemon
  Loaded: loaded (/etc/systemd/system/direwolf.service; enabled)
  Active: inactive (dead) since Sat 2017-05-13 17:56:49 PDT; 1min 22s ago
...
# service direwolf start
# service direwolf status
- direwolf.service - Direwolf Daemon
  Loaded: loaded (/etc/systemd/system/direwolf.service; enabled)
  Active: active (running) since Sat 2017-05-13 18:00:43 PDT; 2s ago
...
```



# Direwolf Configuration

The direwolf configuration lives in 2 places:

- `direwolf.conf` - edit `/etc/direwolf.conf`  
This controls all the modem and packet settings
- ALSA Sound System - configure with `alsamixer` or `amixer`  
This is how you control the sent and received audio levels



# Determining sound card (UDRC example)

```
root@kd7dk-pi2:/home/pi# aplay -l
**** List of PLAYBACK Hardware Devices ****
card 0: ALSA [bcm2835 ALSA], device 0: bcm2835 ALSA [bcm2835 ALSA]
  Subdevices: 8/8
    Subdevice #0: subdevice #0
    Subdevice #1: subdevice #1
    Subdevice #2: subdevice #2
    Subdevice #3: subdevice #3
    Subdevice #4: subdevice #4
    Subdevice #5: subdevice #5
    Subdevice #6: subdevice #6
    Subdevice #7: subdevice #7
card 0: ALSA [bcm2835 ALSA], device 1: bcm2835 ALSA [bcm2835 IEC958/HDMI]
  Subdevices: 1/1
    Subdevice #0: subdevice #0
card 1: udrc [udrc], device 0: Universal Digital Radio Controller
tlv320aic32x4-hifi-0 []
  Subdevices: 1/1
    Subdevice #0: subdevice #0
```

Default Pi Sound Interface

UDRC





# Determining sound card (SignalLink example)

```
root@kd7dk-pi2:/home/pi# aplay -l
**** List of PLAYBACK Hardware Devices ****
card 0: ALSA [bcm2835 ALSA], device 0: bcm2835 ALSA [bcm2835 ALSA]
  Subdevices: 8/8
    Subdevice #0: subdevice #0
    Subdevice #1: subdevice #1
    Subdevice #2: subdevice #2
    Subdevice #3: subdevice #3
    Subdevice #4: subdevice #4
    Subdevice #5: subdevice #5
    Subdevice #6: subdevice #6
    Subdevice #7: subdevice #7
card 0: ALSA [bcm2835 ALSA], device 1: bcm2835 ALSA [bcm2835 IEC958/HDMI]
  Subdevices: 1/1
    Subdevice #0: subdevice #0
card 1: CODEC [USB Audio CODEC], device 0: USB Audio [USB Audio]
  Subdevices: 1/1
    Subdevice #0: subdevice #0
```

Default Pi  
Sound  
Interface

SignalLink



# Configuration File Format (direwolf.conf)

# Comment text

KEYWORD VALUE [VALUE2 ...]

*Optional output device*

ADEVICE plughw:CARD=udrc,DEV=0 plughw:CARD=udrc,DEV=0

ADEVICE1 plughw:1,0

IGSERVER noam.aprs2.net

IGLOGIN KD7DK 17634

PBEACON sendto=IG delay=0:30 every=60:00 symbol="igate" overlay=R  
lat=47^40.19N long=122^24.14W

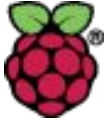


# A Simple Config file (no Internet gateway)

```
ADEVICE plughw:CARD=udrc,DEV=0  
ARATE 48000  
ACHANNELS 2
```

```
#HD-15  
CHANNEL 0  
MYCALL KD7DK-6  
MODEM 1200  
PTT GPIO 12  
#DIN-6  
CHANNEL 1  
MYCALL KD7DK-7  
MODEM 1200  
PTT GPIO 23
```

```
AGWPORT 8000  
KISSPORT 8001
```



# How do we handle Push-to-Talk?

There are 4 options:

1. Sound card handles PTT (e.g. SignalLink USB)
2. Use General Purpose I/O (GPIO) pins and potentially a relay/transistor (e.g. UDRC)  
`PTT GPIO 12`
3. Use USB serial port adapter and control RS-232 signal lines (DTR, RTS)  
`PTT /dev/ttyUSB0 RTS`
4. HamLib rig control library (open source)  
`PTT RIG 120 /dev/ttyUSB0`  
`PTT RIG 7 localhost:4532`

All of these options are covered in detail in the [Dire Wolf User Guide](#) section 9.2.8



# A Simple Config file (adding Internet gateway)

```
IGSERVER noam.aprs2.net
```

```
IGLOGIN KD7DK 17634
```

```
# Finally, we don't want to flood the radio channel.
```

```
# The IGate function will limit the number of packets transmitted
```

```
# during 1 minute and 5 minute intervals.  If a limit would
```

```
# be exceeded, the packet is dropped and message is displayed in red.
```

```
IGTXLIMIT 6 10
```

```
# Stationary position beacon
```

```
PBEACON sendto=IG delay=0:30 every=60:00 symbol="igate" overlay=R
```

```
lat=47^40.19N long=122^24.14W
```



# Digipeating

Format:

```
DIGIPEAT from-chan to-chan aliases wide preemptive
```

A good default:

```
DIGIPEAT 0 0 ^WIDE[3-7]-[1-7]$|^TEST$ ^WIDE[12]-[12]$ TRACE
```

See the Dire Wolf User Guide section 9.5 for a detailed explanation.



# Configuration - Sound with amixer

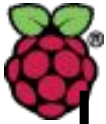
Basil's script sets up this initialization file:

```
/usr/local/src/udrc/set-udrc-din6.sh
```

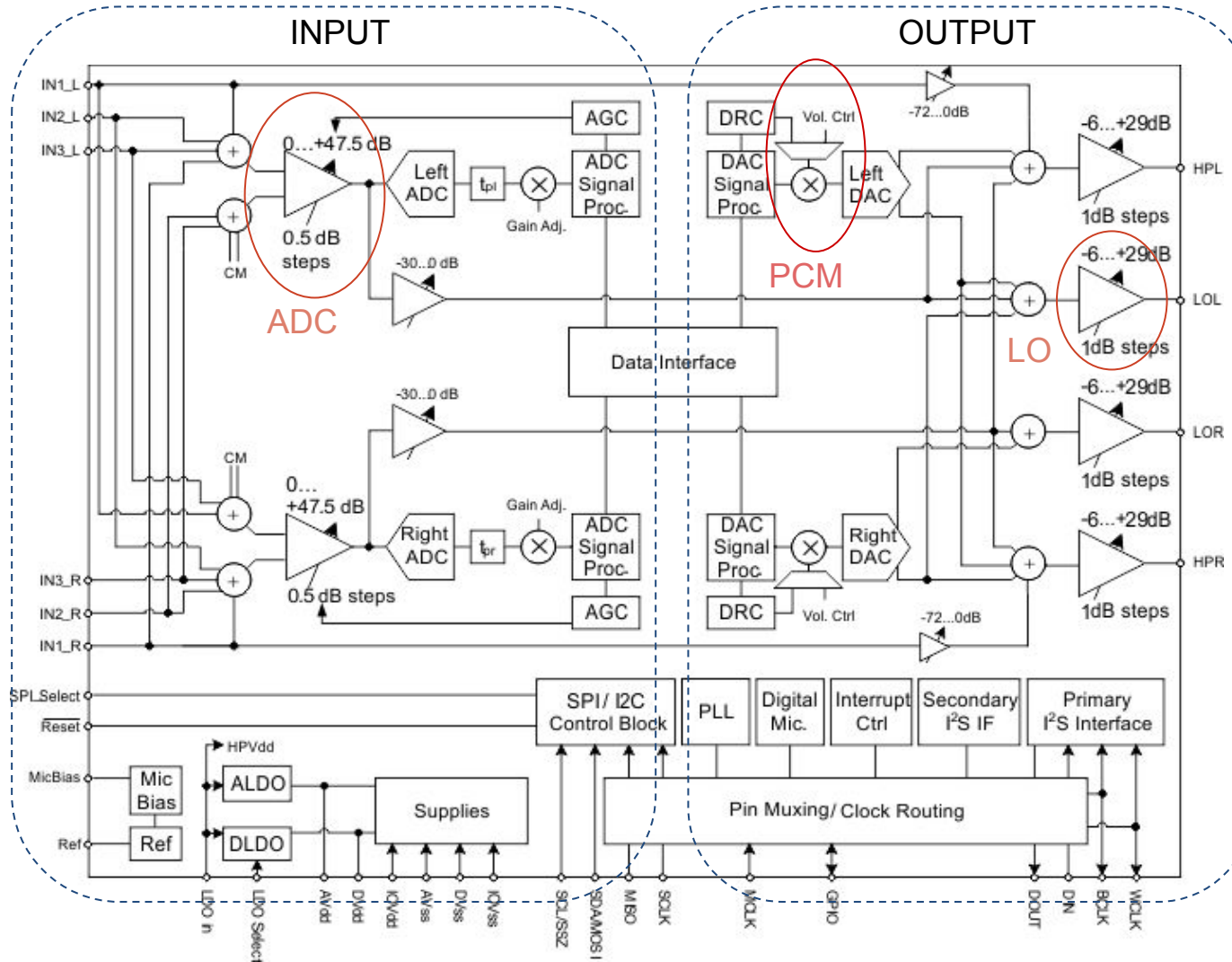
Here's a simple shell script that sets 3 key parameters:

```
#!/bin/bash
```

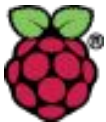
```
amixer -c udrc -s << EOF
# Set input and output levels to 0dB
sset 'ADC Level' -2.0dB
sset 'LO Driver Gain' 0dB
sset 'PCM' 0.0dB
EOF
```



# UDRC-II AIC3204 Block Diagram







# Configuration - Sound with Alsamixer

PCM - Transmit audio (fine)  
ADC - Receive audio  
LO - Transmit audio





# Configuration - Sound with Alsamixer

PCM - Transmit audio (fine)  
ADC - Receive audio  
LO - Transmit audio

```
AlsaMixer v1.0.28
Card: udrc
Chip:
View: F3: [Playback] F4: Capture F5: All
Item: PGA Level [dB gain: 0.00, 0.00]
F1: Help
F2: System information
F6: Select sound card
Esc: Exit

â
â
â
â
â
â
â
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â
â
â

Off Off Off Off Off 00 60<->60 00 00 0<->0
IN2_R to IN3_L to IN3_L to IN3_R to LO DAC LO Drive LOL Outp LOR Outp<PGA Level>
```





# Operation: Diagnostic Output

```
pi@kd7dk-pi2:/var/log/direwolf $ more /var/log/direwolf/direwolf.log
Apr  6 18:45:10 kd7dk-pi2 direwolf[1440]: Dire Wolf version 1.3
Apr  6 18:45:10 kd7dk-pi2 direwolf[1440]: Reading config file /etc/direwolf.conf
Apr  6 18:45:10 kd7dk-pi2 direwolf[1440]: Audio device for both receive and transmit:
plughw:CARD=udrc,DEV=0 (channels 0 & 1)
Apr  6 18:45:10 kd7dk-pi2 direwolf[1440]: Channel 0: 1200 baud, AFSK 1200 & 2200 Hz, E+, 44100
sample rate / 3.
Apr  6 18:45:10 kd7dk-pi2 direwolf[1440]: Channel 1: 1200 baud, AFSK 1200 & 2200 Hz, E+, 44100
sample rate / 3.
Apr  6 18:45:10 kd7dk-pi2 direwolf[1440]: Ready to accept AGW client application 0 on port 8000
...
Apr  6 18:45:10 kd7dk-pi2 direwolf[1440]: Ready to accept KISS client application on port 8001 ...
```



# Operation: Diagnostic Output (simplified)

```
Dire Wolf version 1.3
Reading config file /etc/direwolf.conf
Audio device for both receive and transmit: plughw:CARD=udrc,DEV=0 (channels 0 & 1)
Channel 0: 1200 baud, AFSK 1200 & 2200 Hz, E+, 44100 sample rate / 3.
Channel 1: 1200 baud, AFSK 1200 & 2200 Hz, E+, 44100 sample rate / 3.
Ready to accept AGW client application 0 on port 8000 ...
Ready to accept KISS client application on port 8001 ...
Virtual KISS TNC is available on /dev/pts/0
WARNING - Dire Wolf will hang eventually if nothing is reading from it.
Created symlink /tmp/kisstnc -> /dev/pts/0
KISS protocol set TXDELAY = 50 (*10mS units = 500 mS), port 1
KISS protocol set TXtail = 10 (*10mS units = 100 mS), port 1
KISS protocol set Persistence = 32, port 1
KISS protocol set SlotTime = 20 (*10mS units = 200 mS), port 1
KISS protocol set FullDuplex = 0, port 1
```



# Testing your Direwolf Installation (Receive)

1. Check the UDRC is available: `amixer -c udrc`
2. Attach a radio tuned to APRS frequency (144.39 MHz)
3. Listen via speaker to confirm traffic, then attach to UDRC
4. Check for packet in Direwolf logs:

```
tail -f /var/log/direwolf/direwolf.log
```

5. Check receive audio:

```
audio level = 53(20/20) [NONE] |||||___
```

```
Format: level(mark/space) displayRetries spectrum
```

6. Adjust audio receive level (ADC for UDRC)



# Testing your Direwolf Installation (Transmit)

There are three options:

1. For UDRRC, generate a test tone with (instructions at top of file)  
`n7nix/deviation/measure_deviate.sh`
2. Others can generate test tones with direwolf  
`direwolf -x -c /etc/direwolf.conf`
3. Listen to yourself generate packets while listening on another radio and tailing log file

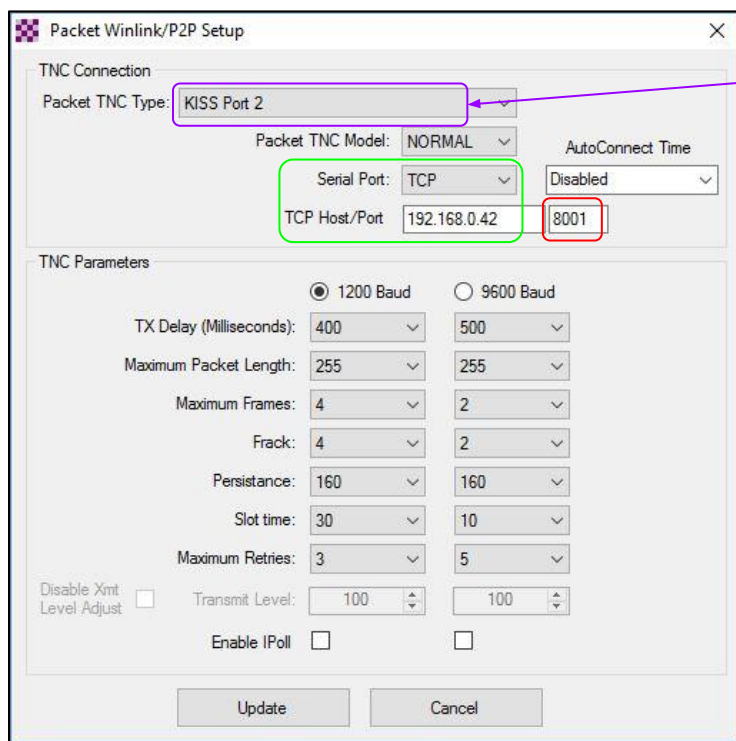
Measure with a service monitor or compare to other signals.

Target deviation is 3-3.5 KHz.

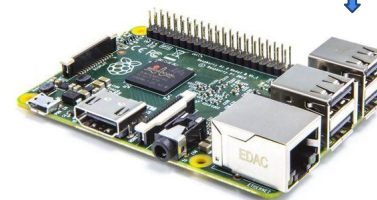
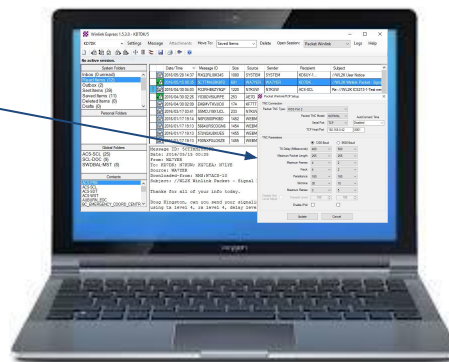


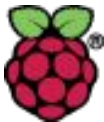
# Using Winlink Express with your Raspberry Pi TNC

Direwolf is listening for KISS connections on TCP port 8001



Could be KISS or KISS Port 2





# The Wireless TNC configuration

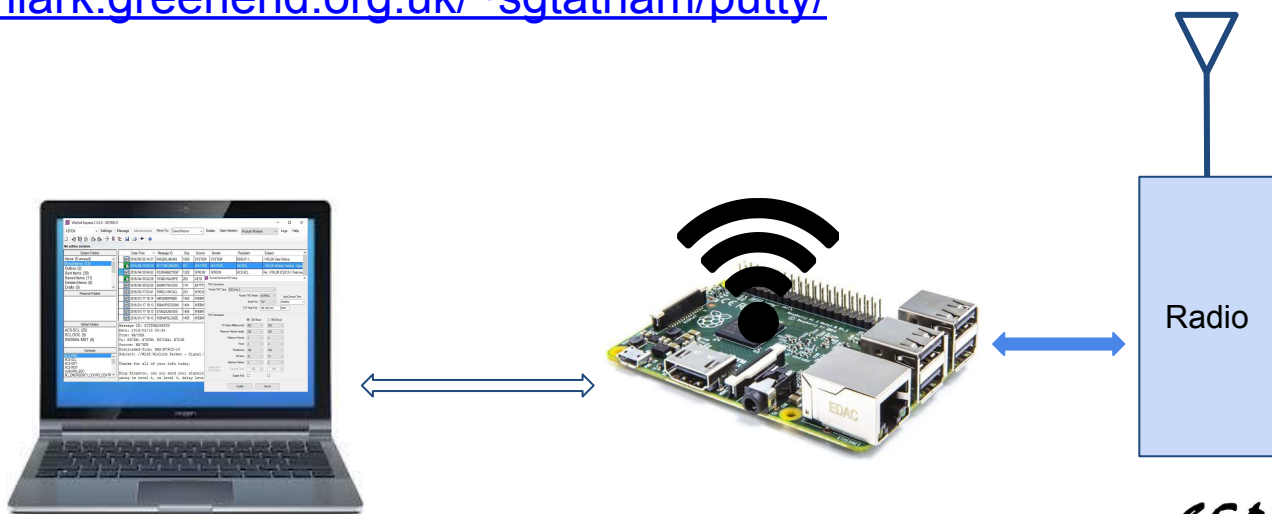
The Raspberry Pi can be a wireless client or a wireless access point.

If you are away from network infrastructure, configure your Pi as an access point and let your laptop and other devices connect to the Pi.

<https://frillip.com/using-your-raspberry-pi-3-as-a-wifi-access-point-with-hostapd/>

To login to your Pi over the network, use ssh connection with putty:

<https://www.chiark.greenend.org.uk/~sgtatham/putty/>







# Pi & UDRC Resources

<https://nw-digital-radio.groups.io/g/udrc/wiki/home>

- [Configuring ircDDBgateway](#)
- [Creating Virtual Sound Cards for the UDRC™](#)
- [Generate a Tone to Set Radio Deviation via the UDRC™](#)
- [Notes for the Kenwood TKR 750 850 Repeater](#)
- [Powering the UDRC™ and Raspberry Pi with 12 VDC](#)
- [PTT Keying Application Note UDRC II](#)
- [UDRC™ and Direwolf Packet Modem](#)
- [UDRC™ and fldigi Setup Page](#)
- [UDRC™ and Raspberry Pi 3 Addendum](#)
- [UDRC™ For Simplex Hotspots and Converted Analog Repeaters](#)
- [UDRC™ II Cabling For 2 radios](#)
- [UDRC™ Setup for the Yaesu DR 1X Repeater](#)
- [UDRC™ With Bridgecom Systems Repeaters](#)

I found this flakey

Really useful!



# Operation: Diagnostic Output Colors

Black for information

Dark Green for the audio level

Green for received raw data

Blue for decoded version of raw data

Magenta for transmitted data

Red for errors

Manual invocation:

```
/usr/local/bin/direwolf -c /etc/direwolf.conf
```



# Direwolf manual startup with enhanced diagnostics

```
root@kd7dk-pi2:/home/pi# /usr/local/bin/direwolf -c /etc/direwolf.conf
Dire Wolf version 1.3

Reading config file /etc/direwolf.conf
Audio device for both receive and transmit: plughw:CARD=udrc,DEV=0 (channels 0 & 1)
Channel 0: 1200 baud, AFSK 1200 & 2200 Hz, E+, 44100 sample rate / 3.
Channel 1: 1200 baud, AFSK 1200 & 2200 Hz, E+, 44100 sample rate / 3.
Ready to accept AGW client application 0 on port 8000 ...
Ready to accept KISS client application on port 8001 ...
Use -p command line option to enable KISS pseudo terminal.

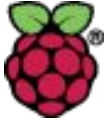
Digipeater WIDE2 (probably ERINB) audio level = 60(22/22) [NONE] _|1111___
[1.3] AC7KP-1>T6UTXT,W7PFR-1,WIDE1,ERINB,WIDE2*: 21A1*;>/ *5c}t+1% *rllwN:!!3
MIC-E, normal car (side view), Byonics TinyTrack3, In Service
N 46 54.8449, W 122 21.3727, 0 MPH, course 231, alt 548 ft
Seq=926, A1=440, A2=627

Now connected to IGate server noam.aprs2.net (66.109.111.18)
Check server status here http://66.109.111.18:14501

Digipeater WIDE2 (probably ERINB) audio level = 55(21/21) [NONE] |111111__
[1.3] WA7VC-10>APRX28,SOMTN,WIDE1,ERINB,WIDE2*:!4727.90N/12140.74W;Fill-in iGate & TX-Digi
Position, Portable operation (tent), >40 APRSmax
N 47 27.9000, W 121 40.7400
Fill-in iGate & TX-Digi
^C
QRT
root@kd7dk-pi2:/home/pi#
```

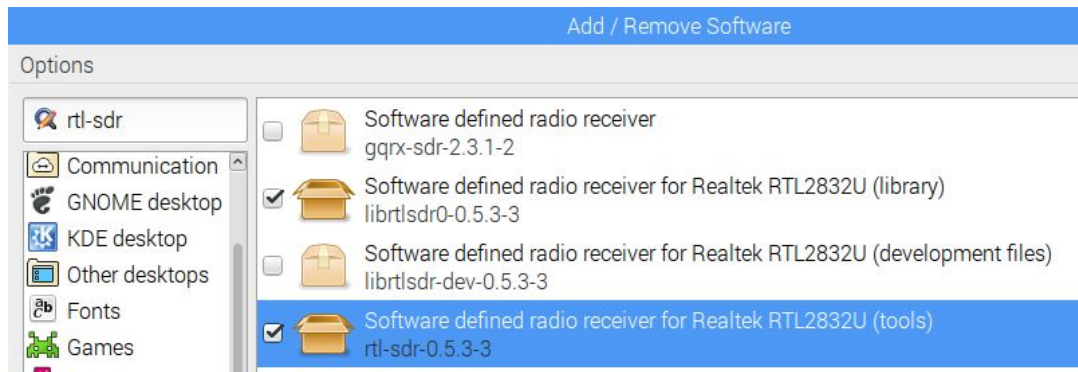
Detected hardware and config settings

Good, balanced audio levels!



# RTL-SDR Receive-only Radio Input to Direwolf

## 1. Install the RTL Software



2. From the command line type the following to invoke the rtl\_fm application and pipe the data to direwolf:

```
rtl_fm -f 144.39M -o 4 - | direwolf -n 1 -r 24000 -b 16 -
```

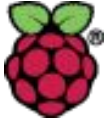


# Xastir



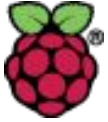
# Xastir

- APRS Client Application
- Provides mapping, tracking, messaging, weather, weather alerts, and Search & Rescue features over radio or internet.
- Can be configured for Igate and digipeater functionality
- Can take GPS input for location



# Xastir Installation

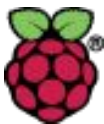
- Should already be installed on your Compass Image
- Invoked from a terminal window (click on the terminal icon on desktop upper right, then type `xastir` and return). Xastir will run and the terminal window will remain in the background.
- If not using the compass image, install as follows: `sudo apt-get install xastir`



# Xastir Configuration

- Connections
  - GPS
  - TNC
- Define Station Attributes
  - Location
  - Power output, Antenna Height/Gain
  - Timing
- Define what maps you would like to see





# Xastir Screen

XASTIR - X Amateur Station Tracking and Information Reporting @ compass

File View Map Station Message Interface Help

TrackMe Draw In Out Measure Move

CC BY SA

RANGE SCALE 16 mi

Amateur APRS(tm) Station AE7RD 46°21,845N 124°04,248W CN76xi 11/19 Station Zoom 480



# File/Configure/Station Page 1

XASTIR - X Amateur Station Tracking and Information Reporting @ compass

File View Map Station Message Interface Help

TrackMe Draw In Out Measure Move

Print

Configure

- Open Log File
- TNC Logging
- Net Logging
- IGate Logging
- Message Logging
- WX Logging
- WX Alert Logging
- PNG Snapshots
- KML Snapshots

Exit

Station

- Defaults
- Timing
- Coordinate System
- Audio Alarms
- Speech
- Smart Beacons
- Fonts
- Test
- Change Debug Level
- Enable English Units
- Dist/Bearing Status
- Save Config Now!

RANGE SCALE 10 mi

Waiting for GPS data..

46°33.765N 124°09.330W CN76wn 12/21 Station Zoom 480



# File/Configure/Station (Page 2)

XASTIR - X Amateur Station Tracking and Information Reporting @ compass

File View Map Station Message Interface Help

TrackMe Draw In Out Measure Move

CC BY SA

### Configure Station

Callsign:   Send compressed posits

LAT:  deg  min  (N/S)

LONG:  deg  min  (E/W)

Station Symbol

Group/overlay:  Symbol:

Power - Height (HAAT) - Gain - Directivity

◆ Disable PHG ◆ 0W ◆ 1W ◆ 4W ◆ 9W ◆ 16W ◆ 25W ◆ 36W ◆ 49W ◆ 64W ◆ 81W

◆ 10ft ◆ 20ft ◆ 40ft ◆ 80ft ◆ 160ft ◆ 320ft ◆ 640ft ◆ 1280ft ◆ 2560ft ◆ 5120ft

◆ 0dB ◆ 1dB ◆ 2dB ◆ 3dB ◆ 4dB ◆ 5dB ◆ 6dB ◆ 7dB ◆ 8dB ◆ 9dB

◆ Omni ◆ 45° ◆ 90° ◆ 135° ◆ 180° ◆ 225° ◆ 270° ◆ 315° ◆ 360°

Comment:

Position Ambiguity

◆ None ◆ .11 miles ◆ 1.15 miles ◆ 11.51 miles ◆ 69.09 miles

RANGE SCALE 16 mi

WB8AAG

40 22,300N 123 30,000W Cloudy 12/21 300000 200M 40V



# Adding an Interface (Page 1)

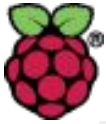
XASTIR - X Amateur Station Tracking and Information Reporting @ compass

File View Map Station Message **Interface** Help  TrackMe  Draw  In  Out  Measure  Move

Interface Control

- Disable Transmit: ALL
- Disable Transmit: My Position
- Disable Transmit: Objects/Items
- Enable Server Ports
- Transmit Now!

Amateur APRS(tm) Station AE7RD 46°33.845N 123°46.924W CN86cn 5/6 Stations Zoom 480



# Adding and Interface (Page 2)

XASTIR - X Amateur Station Tracking and Information Reporting @ compass

File View Map Station Message Interface Help TrackMe Draw In Out Measure Move

CC BY SA

### Interface Control

Device	0	UP	Networked GPS (via gpsd) localhost:2947
Device	1	UP	Networked AGWPE localhost:8000

Start Start All Add Delete

Stop Stop All Properties Close

### Choose...e Type

Choose Interface Type

- Serial TNC
- Serial TNC w/GPS on a HSP cable
- Serial GPS
- Serial WX
- Internet Server
- AX25 TNC
- Networked GPS (via gpsd)
- Networked WX
- Serial TNC w/GPS on AUX port
- Serial KISS TNC
- Networked Database (Not Implemented Yet)
- Networked AGWPE
- Serial Multi-Port KISS TNC

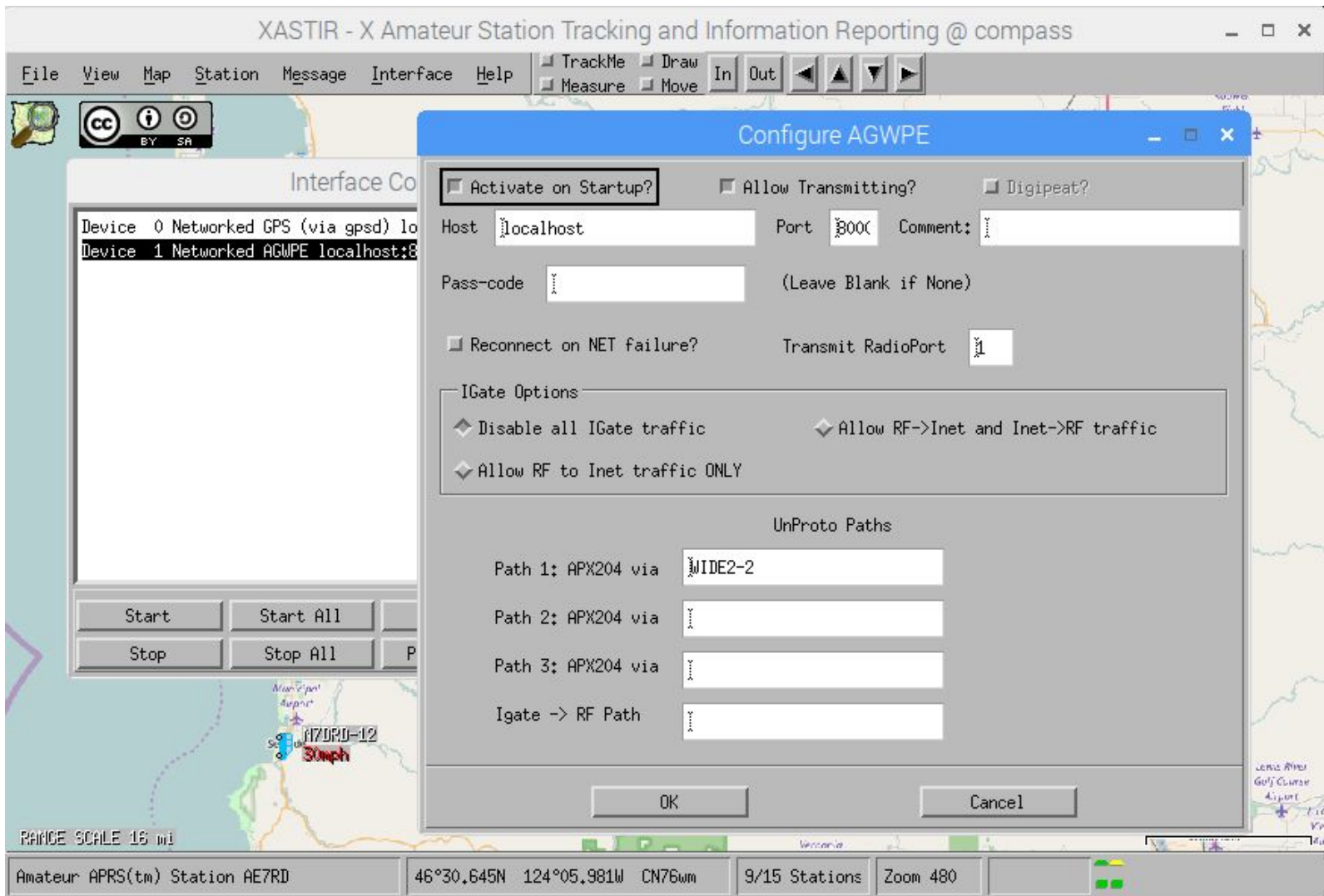
Add Close

RANGE SCALE 16 mi

WB8AAG New station! 46°09.125N 123°23.592W CN86hd 9/15 Stations Zoom 480

The screenshot displays the XASTIR software interface. At the top, the title bar reads 'XASTIR - X Amateur Station Tracking and Information Reporting @ compass'. Below the title bar is a menu bar with 'File', 'View', 'Map', 'Station', 'Message', 'Interface', and 'Help'. To the right of the menu bar are several icons: 'TrackMe', 'Draw', 'In', 'Out', 'Measure', and 'Move'. The main area is a map showing station locations. Two windows are open: 'Interface Control' and 'Choose...e Type'. The 'Interface Control' window shows a table with two devices: Device 0 (UP, Networked GPS) and Device 1 (UP, Networked AGWPE). Below the table are buttons for 'Start', 'Start All', 'Add', 'Delete', 'Stop', 'Stop All', 'Properties', and 'Close'. The 'Choose...e Type' window lists various interface types, including 'Serial TNC', 'Serial GPS', 'Internet Server', 'AX25 TNC', 'Networked GPS', 'Serial TNC w/GPS on AUX port', 'Serial KISS TNC', 'Networked Database', 'Networked AGWPE', and 'Serial Multi-Port KISS TNC'. At the bottom of the interface, there is a status bar with the call sign 'WB8AAG', a 'New station!' message, coordinates '46°09.125N 123°23.592W', a grid square 'CN86hd', '9/15 Stations', and 'Zoom 480'. A range scale of 16 miles is also visible.

# Configure AGWPE (Connection to Direwolf)



XASTIR - X Amateur Station Tracking and Information Reporting @ compass

File View Map Station Message Interface Help TrackMe Draw In Out Measure Move

Interface Co

Device 0 Networked GPS (via gpsd) lo  
Device 1 Networked AGWPE localhost:3000

Start Start All  
Stop Stop All P

RANGE SCALE 16 mi

Amateur APRS(tm) Station AE7RD 46°30,645N 124°05,981W CN76wm 9/15 Stations Zoom 480

### Configure AGWPE

Activate on Startup?  Allow Transmitting?  Digipeat?

Host localhost Port 3000 Comment:

Pass-code (Leave Blank if None)

Reconnect on NET failure? Transmit RadioPort 1

IGate Options

- Disable all IGate traffic
- Allow RF->Inet and Inet->RF traffic
- Allow RF to Inet traffic ONLY

UnProto Paths

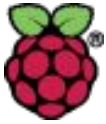
Path 1: APX204 via WIDE2-2

Path 2: APX204 via

Path 3: APX204 via

Igate -> RF Path

OK Cancel



# Adding GPS Interface

The screenshot displays a software application interface for managing GPS interfaces. The main window features a map with various locations and a toolbar with options like 'TrackMe', 'Draw', 'Measure', 'Move', 'In', and 'Out'. An 'Interface Control' window is open, showing a list of devices:

```
Device 0 Networked AGWPE localhost:8000
Device 1 Networked GPS (via gpsd) localhost:2947
```

Below the list are buttons for 'Start', 'Start All', 'Add', 'Delete', 'Stop', 'Stop All', 'Properties', and 'Close'. A 'Choose...e Type' dialog is open, showing a list of interface types:

- Serial TNC
- Serial TNC w/GPS on a HSP cable
- Serial GPS
- Serial WX
- Internet Server
- AX25 TNC
- Networked GPS (via gpsd)**
- Networked WX
- Serial TNC w/GPS on AUX port
- Serial KISS TNC
- Networked Database (Not Implemented Yet)
- Networked AGWPE
- Serial Multi-Port KISS TNC

The 'Networked GPS (via gpsd)' option is selected. A 'Network... GPSD' dialog is also open, showing fields for 'GPSD Host' (localhost), 'GPSD Port' (2947), and a 'Comment' field. There are also checkboxes for 'Activate on Startup?', 'Reconnect on failure?', and 'Set System Clock from GPS Data?'.



# GPS Installation and Configuration

From NWDIGITALRADIO.COM web site:

<https://nw-digital-radio.groups.io/g/udrc/wiki/UDRC%E2%84%A2-and-Direwolf-Packet-Modem>

Plug the USB GPS into one of the 4 USB ports on your Raspberry Pi. If it is the only serial device it will typically be a **/dev/ttyUSB0**. If you have other USB serial devices, it may be at some other **/dev/ttyUSBx** (where x is a digit).

```
sudo apt-get install gpsd gpsd-clients
```

Note: Compass Image has taken care of all this. No need to do anything but refer to this chart and the next chart if you're installing on another image.





# GPS Installation and Configuration

Configure `gpsd` by editing `/etc/default/gpsd` –

Note: You need to use **sudo** `nano /etc/default/gpsd` to edit the file (need privileges)

For `/dev/ttyUSB0` the file will contain:

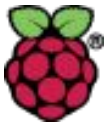
```
# Default settings for the gpsd init script and the hotplug wrapper.
# Start the gpsd daemon automatically at boot time
START_DAEMON="true"
# Use USB hotplugging to add new USB devices automatically to the daemon
USBAUTO="true"
# Devices gpsd should collect to at boot time.
# They need to be read/writeable, either by user gpsd or the group dialout.
DEVICES="/dev/ttyUSB0"
# Other options you want to pass to gpsd
GPSD_OPTIONS=""
```

Then start `gpsd` with the following command:

```
sudo systemctl start gpsd
```

Finally, enable the service so it will start automatically:

```
sudo systemctl enable gpsd
```



# Station Menu

XASTIR - X Amateur Station Tracking and Information Reporting @ compass

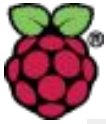
File View Map Station Message Interface Help

TrackMe Draw In Out Measure Move

Send Message To  
Show Pending Messages  
Open Group Messages  
Clear All Outgoing Messages  
General Stations Query  
IGate Stations Query  
WX Stations Query  
Modify Auto Reply Message  
 Enable Auto Reply Message  
 Satellite Ack Mode

RANGE SCALE 16 mi

KNAPPA 46°33.845N 124°00.668W CN76xn 6/7 Stations Zoom 480



# Map/Map Chooser Menu

XASTIR - X Amateur Station Tracking and Information Reporting @ compass

File View Map Station Message Interface Help

TrackMe Draw In Out  
Measure Move

### Map Chooser

Expand Dirs Dirs/Maps Selected: 0/1 Properties

- Online/CanadaTopo250k.geo
- Online/CanadaTopo50k.geo
- Online/OSM\_cloudmade\_1.geo
- Online/OSM\_cloudmade\_2.geo
- Online/OSM\_cloudmade\_5.geo
- Online/OSM\_cloudmade\_998.geo
- Online/OSM\_tiled\_cycle.geo
- Online/OSM\_tiled\_mapnik.geo**
- Online/OSM\_tiled\_osmarender.geo
- Online/OSM\_tiled\_skiing.geo
- Online/TXRadar.geo
- Online/USRadar.geo
- Online/WMSRadar.geo

Clear Vector 250k Topo 100k Topo 24k Topo Apply OK Cancel

Amateur APRS(tm) Station AE7RD 46°05.685N 123°18.280W CN86ic 5/6 Stations Zoom 480

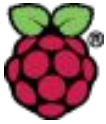


# File/Configure/Timing

The screenshot shows a software interface with a menu bar (File, View, Map, Station, Message, Interface, Help) and a toolbar (TrackMe, Draw, Measure, Move, In, Out, navigation arrows). A map on the left shows two airports: Martin Airport and Port of Ilwaco Airport. A 'Configure Timing' dialog box is open, displaying the following settings:

Setting	Value
Posit TX Interval (min)	30.0
Station Ghosting Time (min)	80
Object/Item Max TX Interval (min)	30
Station Clear Time (hours)	12
GPS Check Interval (sec)	60
Station Delete Time (days)	1
Dead-Reckoning Timeout (min)	10
Serial Inter-Char Delay (ms)	1
New Track Time (min)	45
New Track Interval (degrees)	1
RIND -> Objects Interval (min), 0 = Disabled	0
Internet Map Timeout (sec)	120
Snapshot Interval (min)	5

Buttons: OK, Cancel



# File/Configure/Defaults

File View Map Station Message Interface Help  TrackMe  Draw  Measure  Move In Out

### Configure Defaults

Transmit Station Option

- Fixed Station
- Mobile Station w/local time
- Mobile Station w/Zulu date-time
- Mobile Station w/Zulu time-seconds
- Station Position w/weather
- Station Position, Zulu date-time, and weather

IGate Options

- Disable all IGate traffic
- Allow RF->Inet and Inet->RF traffic
- Allow RF to Inet traffic ONLY

Transmit compressed objects/items?  Activate Alternate net?  Disable Posit Dupe-Checks

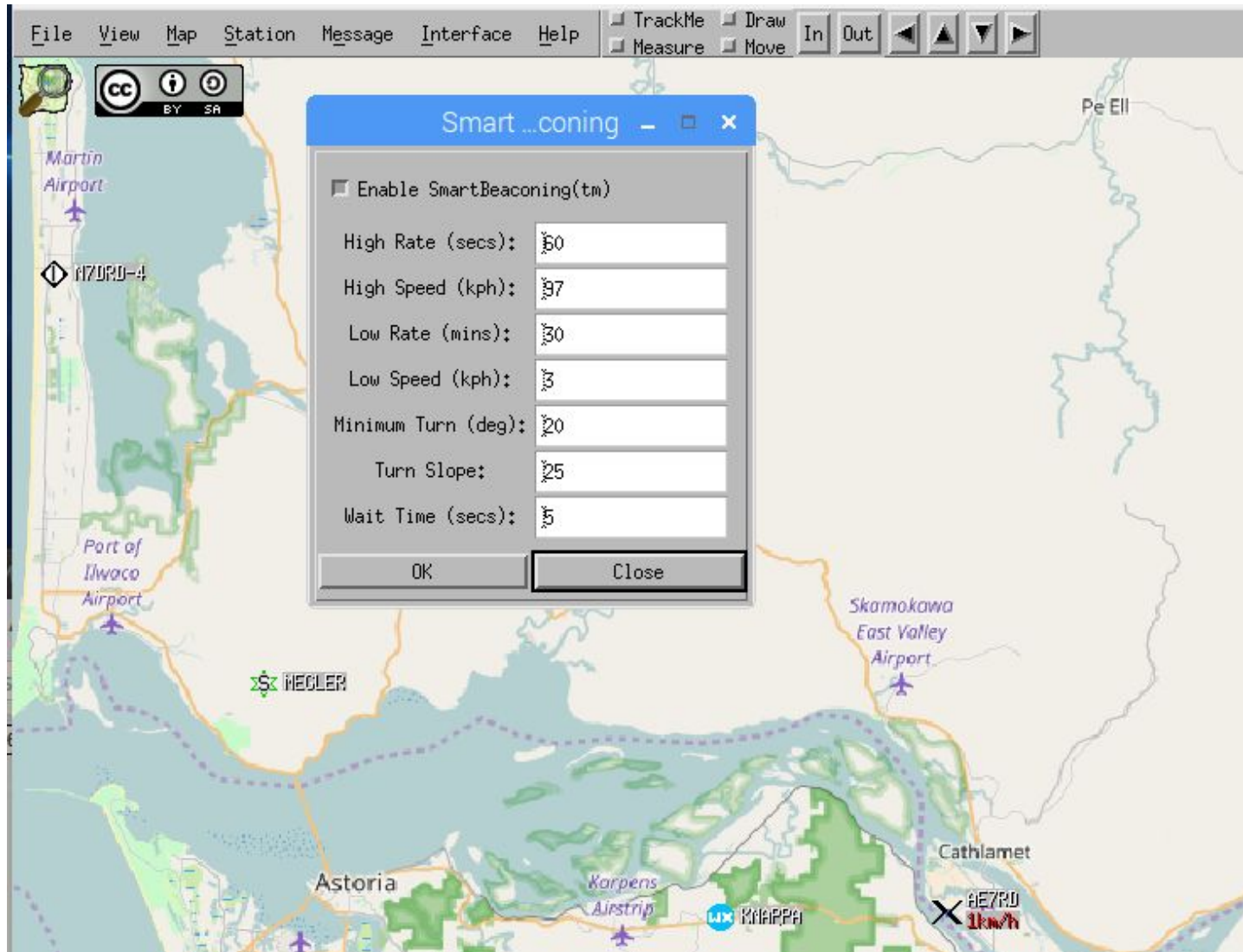
Pop up new bulletins ALTNET: XASTIR

View zero-distance bulletins  Warn if Modifier Keys  My trails in one color

Load predefined objects from file /usr/share/xastir/config

OK Cancel

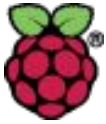
# File/Configure/Smart Beaconsing



The screenshot shows a software interface with a map of the Pacific Northwest coast. A dialog box titled "Smart Beaconsing" is open, displaying the following configuration options:

- Enable SmartBeaconsing(tm)
- High Rate (secs): 50
- High Speed (kph): 97
- Low Rate (mins): 30
- Low Speed (kph): 3
- Minimum Turn (deg): 20
- Turn Slope: 25
- Wait Time (secs): 5

The dialog box has "OK" and "Close" buttons at the bottom. The background map shows various locations including Martin Airport, Port of Ilwaco Airport, Skamokawa East Valley Airport, Astoria, Karpens Airstrip, and Cathlamet. A red "X" icon with the text "BEYD 1km/h" is visible on the map near Cathlamet.



# Help/Help Index

The screenshot displays a software application window with a menu bar (File, View, Map, Station, Message, Interface, Help) and a toolbar (TrackMe, Draw, Measure, Move, In, Out, navigation arrows). The main area shows a map of the Clatsop County region, including the Port of Ilwaco Airport, Cathlamet, and Clatsop State Forest. A 'Help Index' dialog box is open, listing the following topics:

- Configure Speech
- Configure Smart Beaconing
- Configure Units of Measure
- Save Config Now!
- Bottom Status Bar
- Moving the Map and the Options Menu
- Objects and Items
- CAD Objects
- View Menu
- Map Menu and the Map Chooser
- Map files and WX Counties

The dialog box has 'View' and 'Close' buttons at the bottom.



# Xastir Scripts

Xastir installs with an assortment of useful scripts located here:

```
/usr/share/xastir/scripts
```

See “Help/Help Index/Included Scripts” for more info

One useful script will download and install the FCC database of amateur radio operators which can be searched when clicking on a station. To download and install the FCC Database:

```
cd /usr/share/xastir/scripts  
sudo ./get-fcc-rac.pl
```





# Searching the FCC Database for Call Sign Information

The screenshot shows a software interface with a map background. A 'Station Chooser' window is open on the left, listing call signs: AE7RD, AE7RD-4, and AE7RD-7. The 'Station Info' window is open in the center, displaying the following information:

```

/x AE7RD [Enable Automatic Updates] [Assign Tactical Call] [Change Trail Color]
FCC Database Lookup
Name: Basham, David C
Street: 305 N Welcome Slough Rd
City: Cathlamet, State: WA, Zip: 98612

Packets received: 0      Last Heard: 05/16/2017 14:20:02
Heard last via Local
Echoed from:
Data path: local
Current Power Gain: 49W @ 40ft HAAT, 6dBomni, range 7.9mi
Last Position: 12/31 16:00 46 10,403N 123 24,595W

CN86he

[Track Station] [Store Track] [Send Message] [Search FCC Database] [Close]
[Station Version Query] [Trace Query] [Un-Acked Messages Query] [Direct Stations Query]

```

A blue arrow points to the 'Search FCC Database' button in the 'Station Info' window.

Right click on a station on the map, pick “Station Info” then click “Search FCC Database”

Note: This function will be grayed out if you have not installed the database.



Questions?

For more information go to:  
[xastir.org](http://xastir.org)