NBEMS

Narrow Band Emergency Messaging System

The Developers

W1HKJ – Dave, licensed for 52 years
        Retired USCG, MSEE, 40+ years in software dev.
        Expert in nothing, but works hard in digital mode code
M0GLD – Stelios, licensed 8 years
        MSCE, doctoral candidate
        Expert in cross platform development
        30+ years old
KH6TY – Skip, licensed 56 years
        Electronics entrepreneur – inventor of WX alert radio
        Developer of Digipan
        Human interface design
WA5ZNU – Leigh, licensed since 1968 (7 years old)
        Expert in all things xml
F8CFE – Stephane
        Originator and principal developer of hamlib

The Support Team

W3NR – Ed, Extra Class
     CW / RTTY & digital modes op
     Retired USPS
     New Installs – RigCAT & Hamlib support
     Patience of an angel – supporting users since version 1.0
WA4SXZ – Rich – licensed since 1965
     elmer for XP/Vista/Linux installations, esp' Yaesu rigs
KB3FXI – Dave
     NBEMS support
W3YJ – Harry
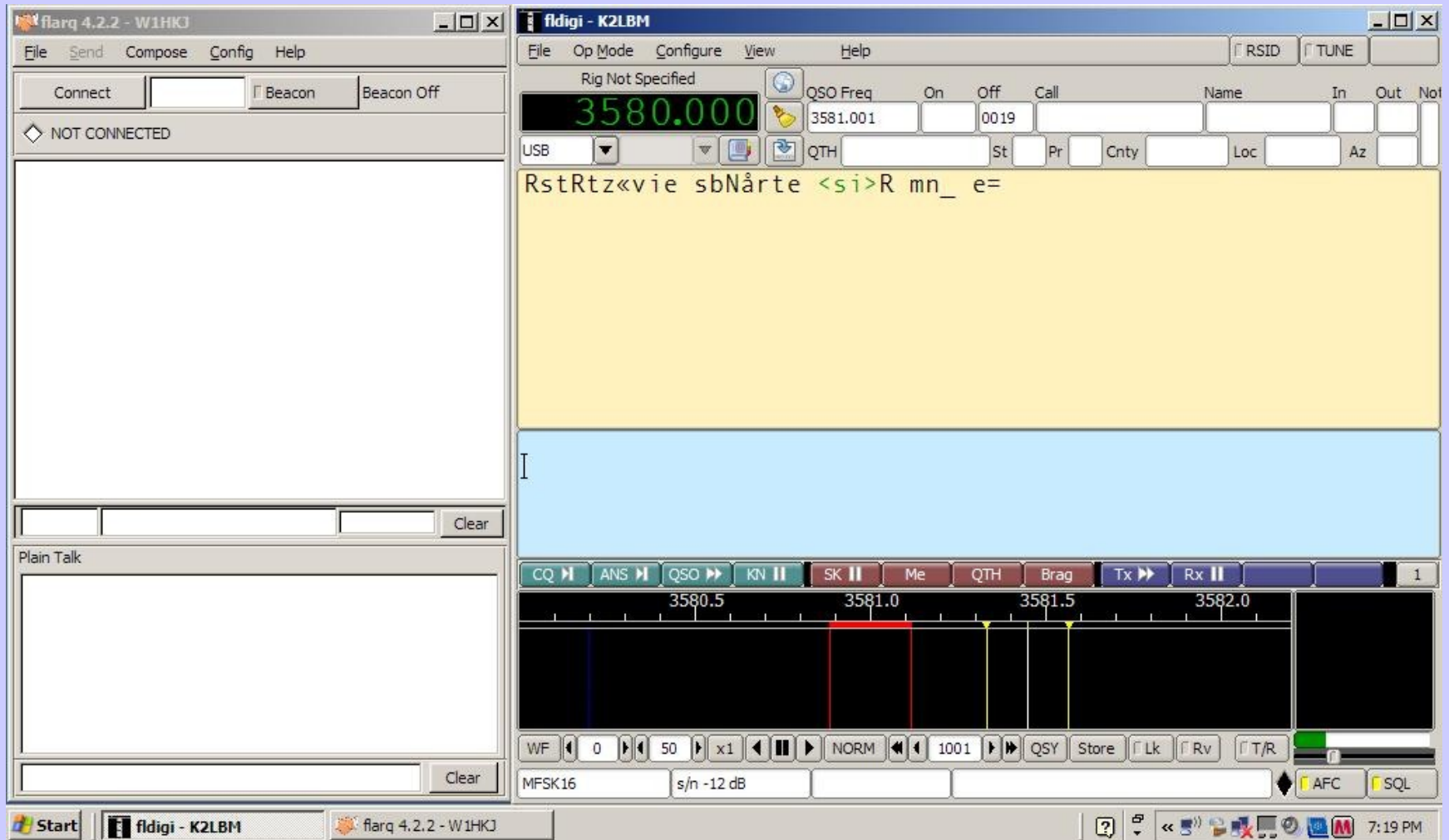   NBEMS support

Many others who help in specific area

NBEMS

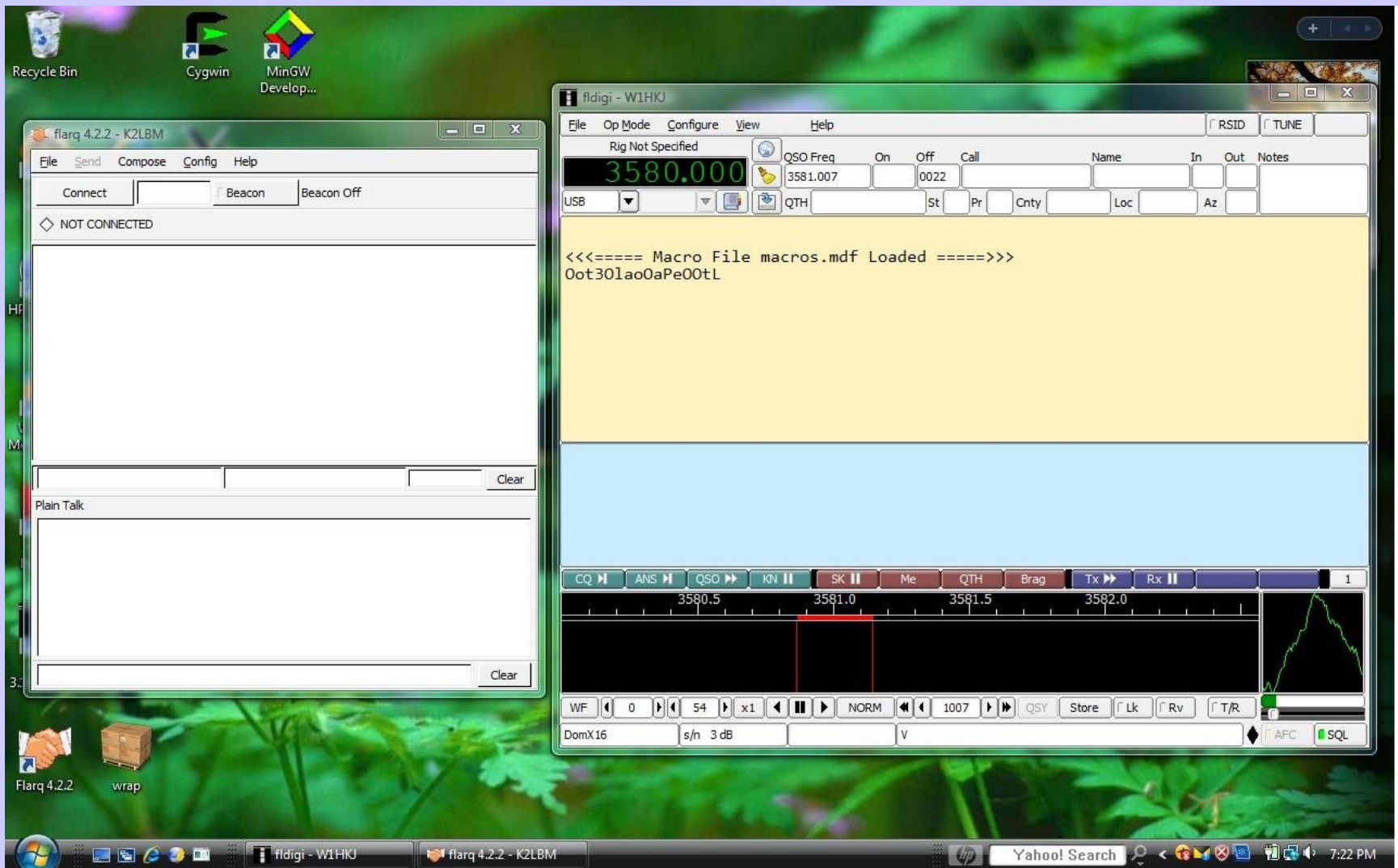## Narrow Band Emergency Messaging System

Is software

fldigi   – digital modem program
flmsg   – message generator / maintenance
flarq   – automated repeat request program
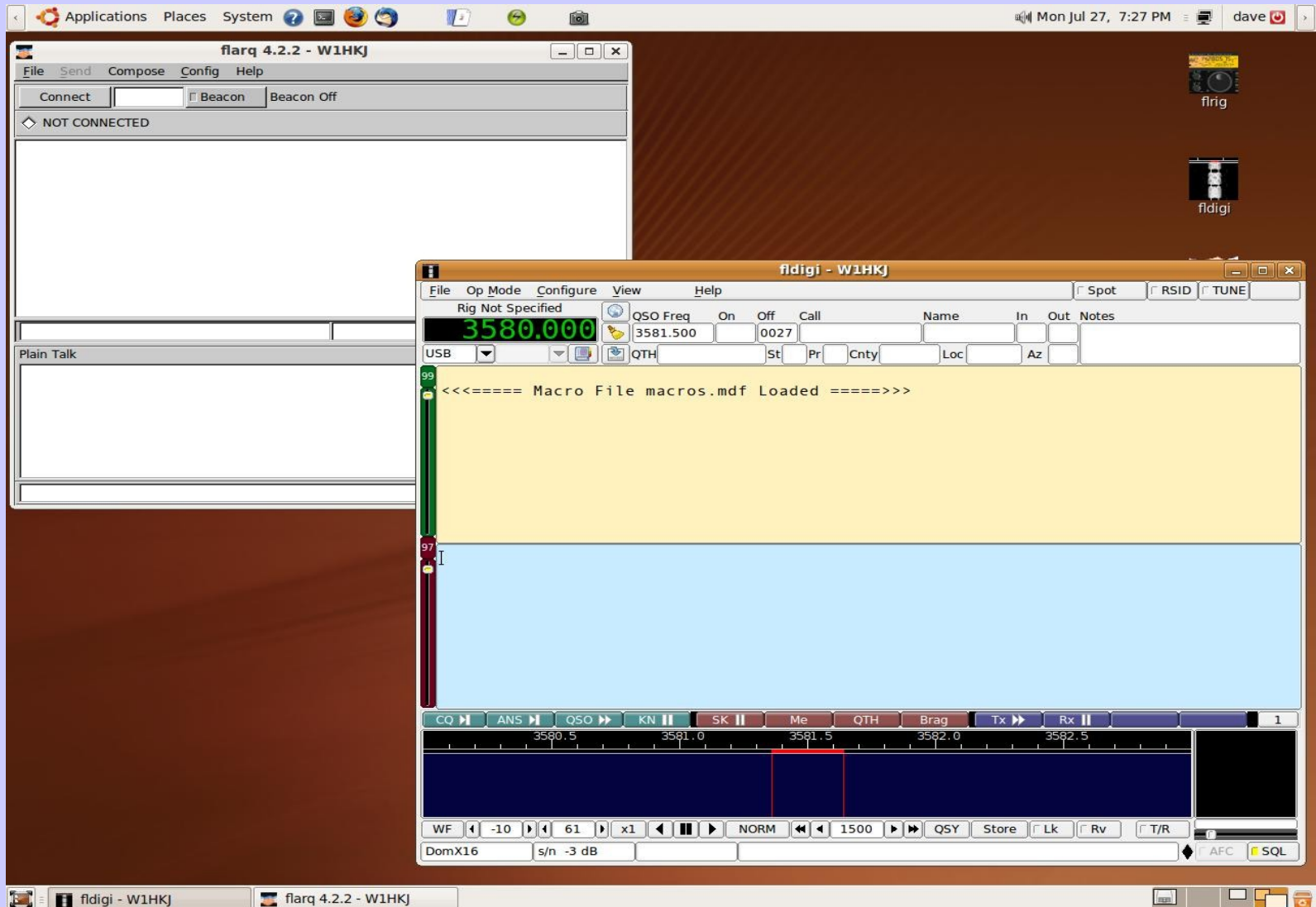flwrap – file encapsulation program

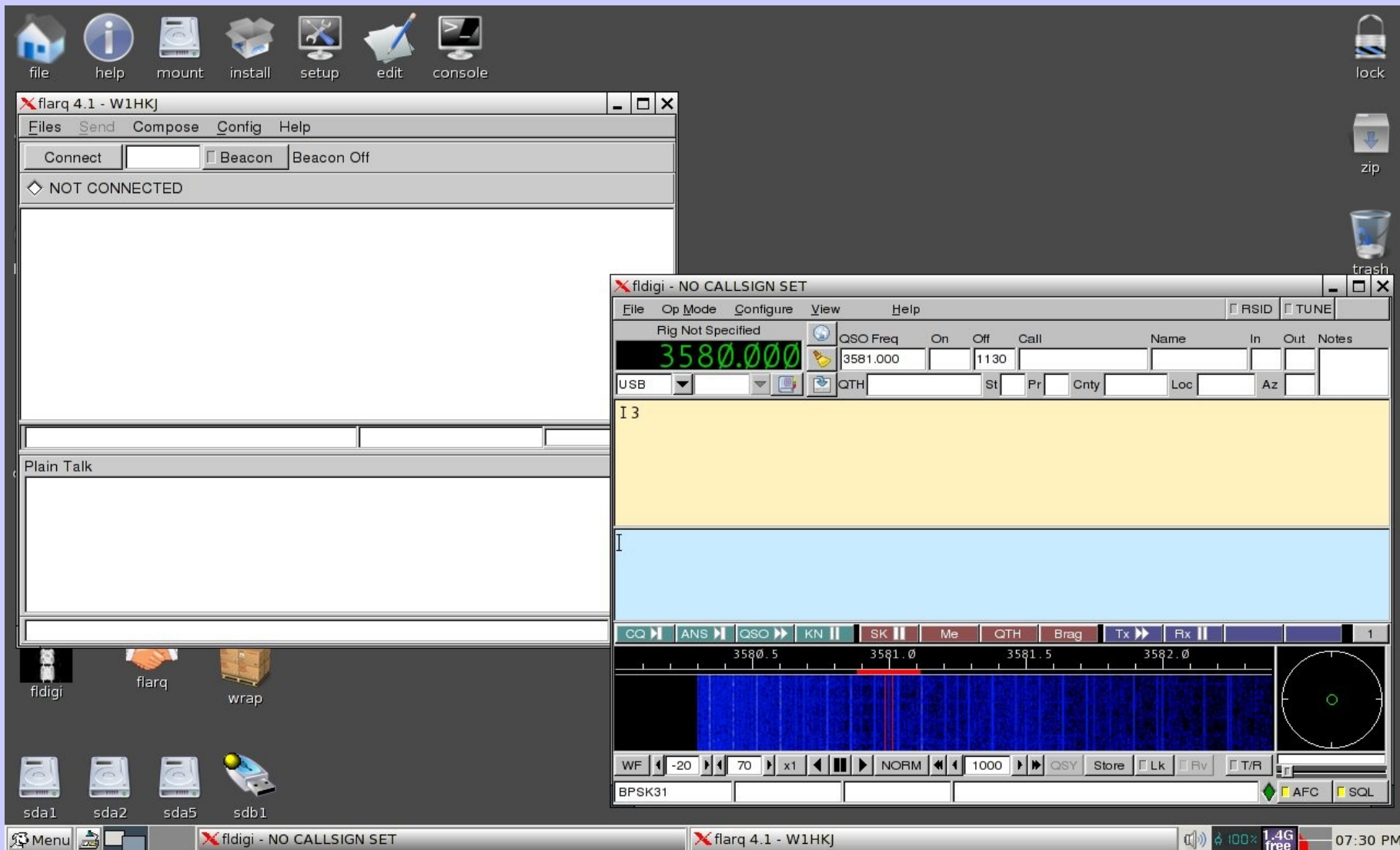# Which Runs on - Xp

Lenovo Netbook

Which Runs on - Vista

Compaq Notebook

Which Runs on - Ubuntu

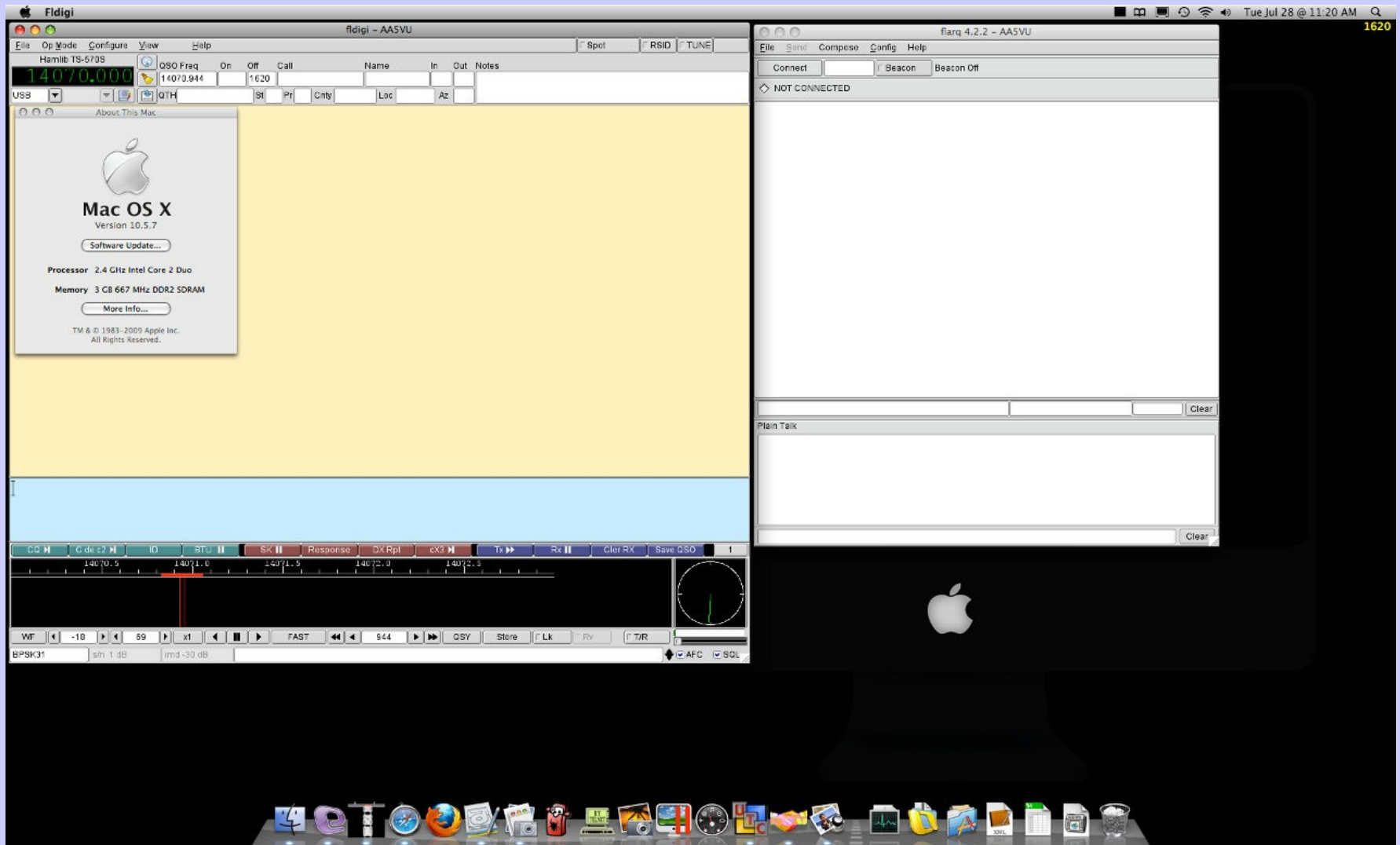## Acer Aspire / Ubuntu 9.04

Which Runs on – Puppy Linux

Compaq Notebook – thumb drive boot

Which Runs on – OS X

Apple

Hardware

- **Windows, Linux or Mac OSX Computer**

Hardware
Sound Card Interface & Transceiver

Sound Card Interface

- Connects computer sound card to the radio

- Provides RF isolation

- Provides ground loop isolation (transformer coupling)

- Can automate the PTT when you transmit.

Hardware
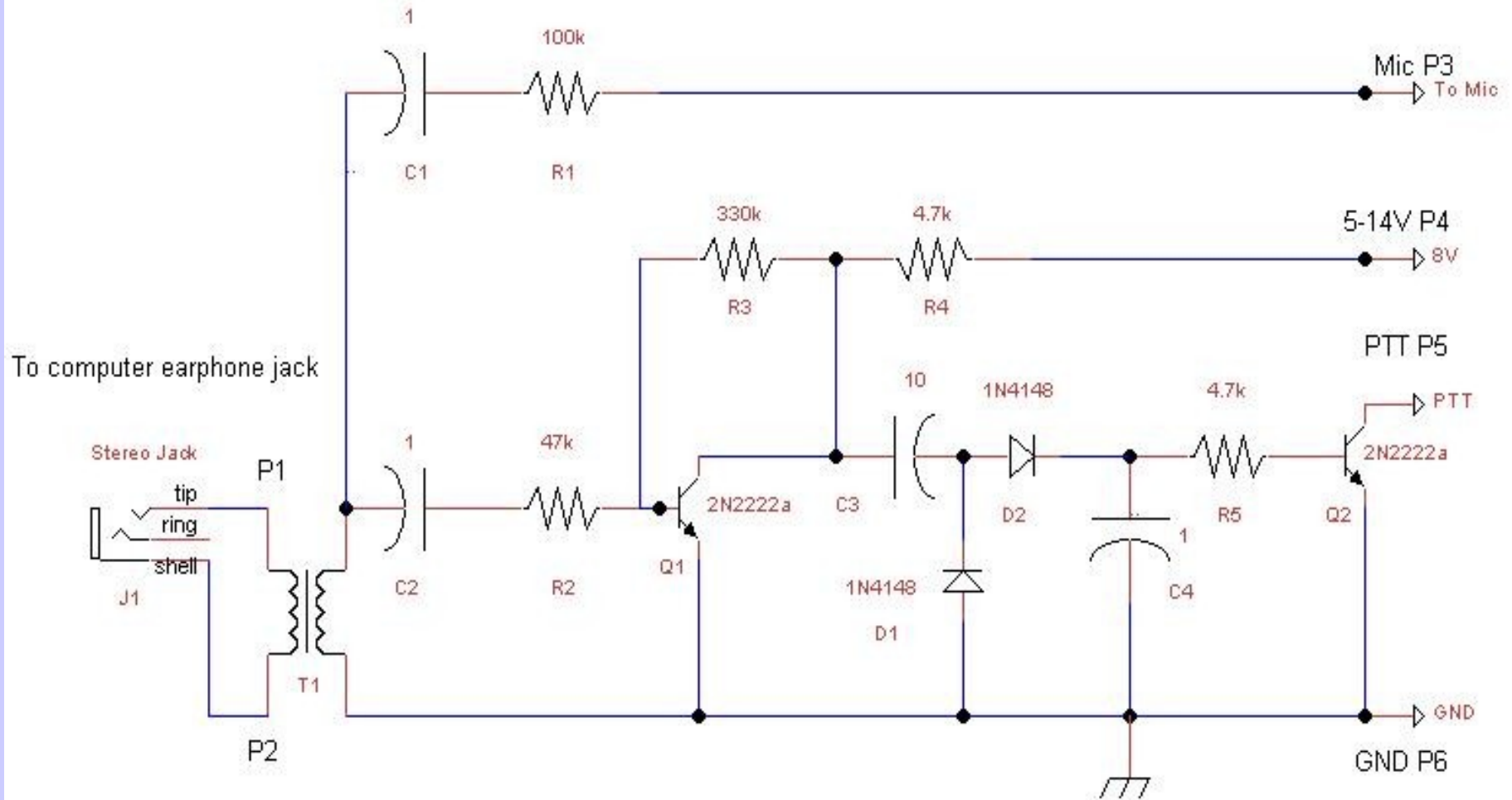
Sound Card Interface

SignaLink SL-1+

Geeks.com $5
USB audio-codec

West Mountain Radio
Rigblaster Advantage

A Homebrew Interface

Hardware

- Windows, Linux or Mac OSX Computer
- Transceiver
- Sound Card Interface
- Or, maybe just a $8 computer microphone

To start playing around... all you need is an inexpensive computer microphone! Just plug a mic into your sound card mic input and place the mic element somewhere near your radio speaker. Listen and watch your display and practice differentiating the various modes.
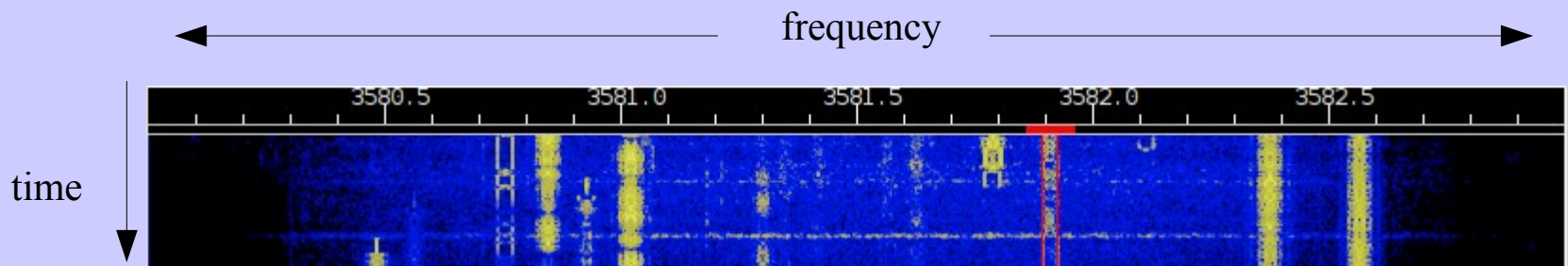
Why Use Digital Modes
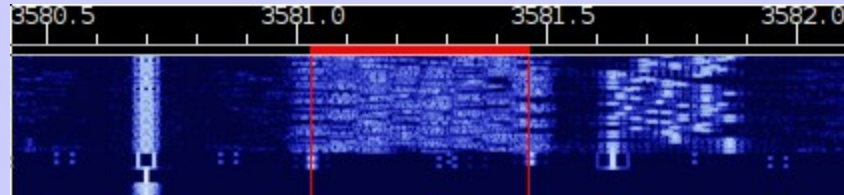
PSK-31   Olivia   MFSK-16

- **Low Power - never need to run over 50 watts, 5 -30 watts is almost always sufficient**
- **Reliable communications – succeeds even when CW fails some modes work below -12 dB s/n**
- **Many modes - choose your mode depending on conditions**
- **Bottom of the solar cycle - works well, even under very poor conditions where phone QSO's would be impossible!**
- **Emergency Communications**
- **You already have 99 % of the equipment – nothing expensive to buy**
- **It's FUN**

Digital Waterfall

Is a visual representation of time, frequency and amplitude

Color == Amplitude
- Blue = low amplitude
- Yellow = medium amplitude
- Red = high amplitude

# Recommended Digital Modes for EmComm with the NBEMS Software Suite

- THOR-16 – moderate speed, works under severe HF conditions, does not require accurate or stable transceiver tuning. Uses FEC (forward error correction)

- Olivia 16/500 – slow but very accurate under poor HF conditions

- MT63 1k/long interleave – relatively fast and best suited for detailed situation reports and formal messages under moderate to good HF conditions

- MT63 2k/long interleave – very fast and extremely effective on VHF/UHF FM

Accuracy, speed and audio bandwidth all come into play and various modes all have their advantages and disadvantages!
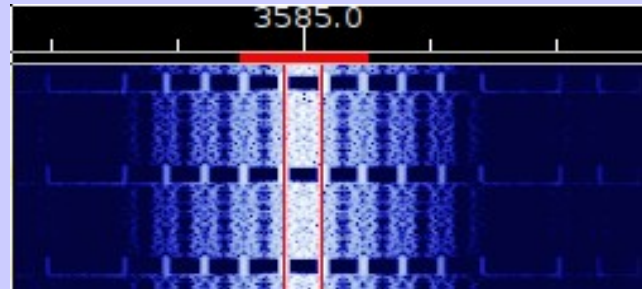
Audio Level Settings

Turn that thing down!

Distortion and non-linear operation (splatter) is caused by overdriving your sound card audio into your radio and it causes severe interference to other stations within the audio passband of the receiving stations!
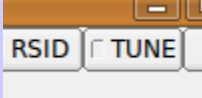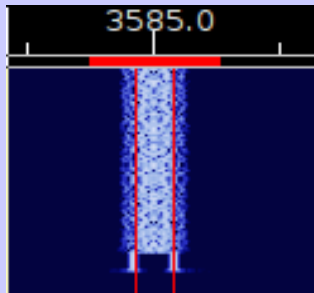

Good

A bad neighbor

Overdrive also increases the error rate at the receiving station

Audio Level Adjustment

- Set your radio RF output to it's maximum power level
- Adjust your sound card mixer master volume to minimum
- Set your radio meter to ALC (automatic level control)
- Click the "Tune" button on fldigi
- Increase your mixer volume control until the ALC meter begins to register
- Back off until no ALC
- Reduce the audio drive (or the transceiver power level) for the desired output level
- You will have just about a perfect transmit signal for ALL modes that fldigi produces

Turn off the tune signal and try sending a PSK-31 idle signal (no keyboard input)

You should see your power meter fluctuate.

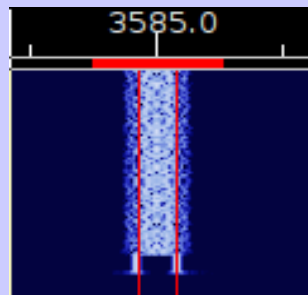As you send text the fluctuation will increase.

Audio Level Adjustment

Turn off the tune signal and try sending
a PSK-31 idle signal (no keyboard input)

You should see your power meter fluctuate.

As you send text the fluctuation will increase.

This is your goal:

Sound Card Calibration

Sound card accuracy is most critical on MFSK, Olivia and MT63.

The errors between your sound card transmit and receive clock and an external standard is measured in parts per million (PPM) based on a given sample rate.

If there is a discrepancy between your Tx and the receiving ends Rx sample rate, the result is the person on the other end of the QSO may not properly decode your transmitted text
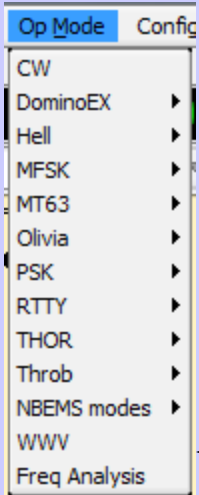
If there is a substantial difference between your Rx and Tx sample rates the other station may have to tune your signal after every exchange.

Two ways to calibrate:
- By receiving WWV – best
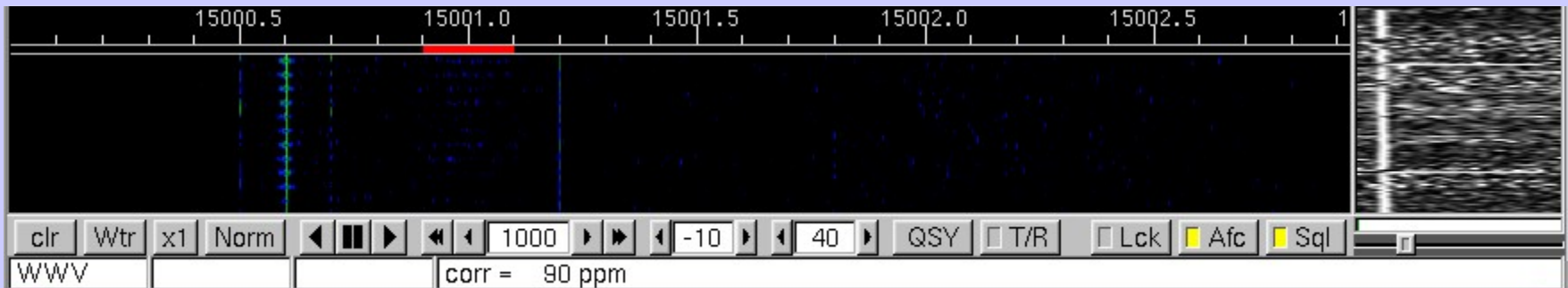- By calibrating all net computers to a master computer

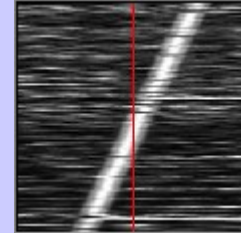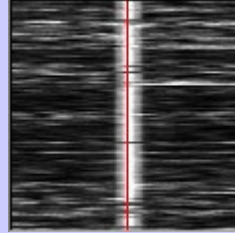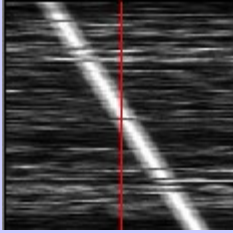# Sound Card Calibration
WWV method

Select the WWV operating mode and tune the radio to WWV at 5, 10 or 15 MHz.
Use USB or AM mode on the radio

The waterfall looks like

Sound Card Calibration
WWV method

Sound Card Calibration
using Master computer

- **Master computer (net controller) is calibrated to WWV (if possible)**

- **Master computer is used to transmit a WWV time tick signal**

    - **WWV mode selecte**

    - **Waterfall cursor set to 1000 Hz**

    - **T/R button pressed**

    - **Master station transmits highly accurate 1 tick / sec WWV type signal**

- **Net computers tune the master station using WWV and calibrate just as if copying the WWV HF broadcast**

This procedure can be used on HF, VHF or UHF

End Part A
Next
NBEMS Modes