WSPR Introduktion

WSPR (Weak Signal Propagation Reporter)
Developed by Joe Taylor K1JT

OZ1PIF, Peter Frenning
EDR Frederikssund Afd.
Ons. 5. okt 2011

Hvem er K1JT?

K1JT = Joe Taylor, Professor (emeritus)i Astrofysik ved Princeton Universitetet i USA. Nobelpris i Fysik 1993 for opdagelsen af Pulsarer ved hjælp af Radioteleskopet i Arecaibo.

Hvad er WSPR?

WSPR (udtales "whisper") står for "Weak Signal Propagation Reporter". Dette program implementerer sende og modtage funktioner for en Digital lydkort mode kalded "MEPT_JT*", eller simpelthen "the WSPR mode".

*) "Manned Experimental Propagation Tests, by K1JT"

WSPR generer og modtager signaler indeholdende strukturerede beskeder, baseret på ”strong forward error correction”, og smalbånds 4-FSK modulation. Dens hovedmål er pålidelig læsning ved meget små signalstyrker. I praksis fungerer det godt ved signal-to-noise ratios ned til omkring -30 dB i en reference bandbredde på 2500 Hz (SSB).

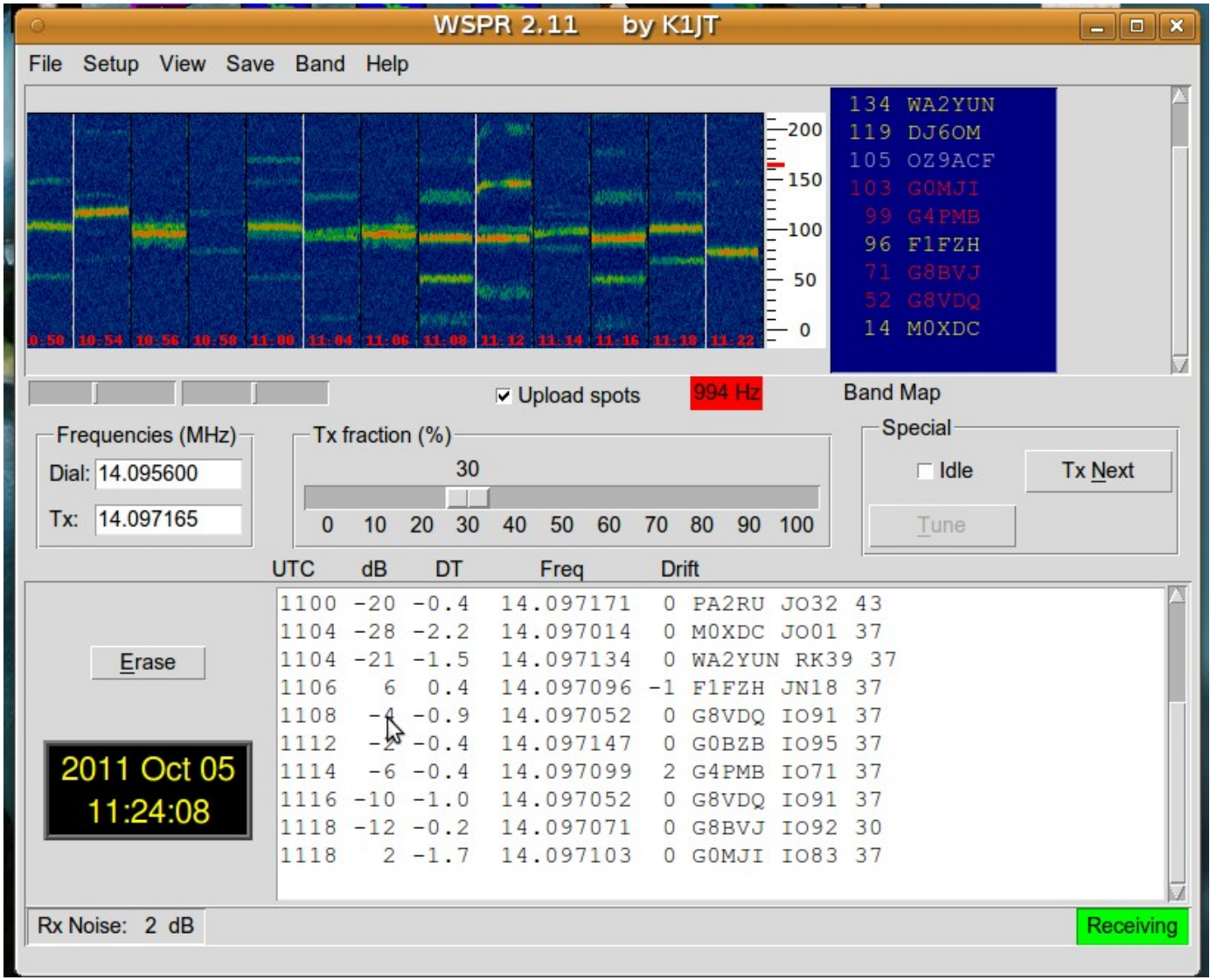
WSPR Operation

- I normal operation viser WSPR evt. ny information hver 2 minutter og er i øvrigt inaktiv på skærmen.

- I receive mode søger programmet efter alle detekterbare MEPT_JT signaler i et 200 Hz passbånd, dekoder dem, og viser resultatet. Hvis intet er detekteret eller dekodet vises intet.

- I T/R mode skifter programmet på en pseudo random måde mellem transmit og receive perioder.

WSPR på Linux Ubuntu



Basale MEPT_JT Specifikationer

1) **Tx message: kaldesignal + 4-tegn-lokator + dBm. Eksempel: "K1JT FN20 30"**
2) **Message længde efter tabsfri kompression: 28 bits for kaldesignal, 15 for lokator, 7 for power level ==> 50 bits total.**
3) **Forward error correction (FEC): long-constraint convolutional code, K=32, r=1/2.**
4) **Antal channel symbols: nsym = (50+K-1)*2 = 162.**
5) **Keying rate: 12000/8192 = 1.46 baud.**
6) **Modulation: continuous phase 4-FSK. Tone separation 1.46 Hz.**
7) **Synynkronisering: 162-bit pseudo-random sync vector.**
8) **Data struktur: hver channel symbol indeholder en sync bit og en data bit.**
9) **Længde af transmission: 162*8192/12000 = 110.6 s.**
10) **Transmission starter to sekunder ind i lige UTC minut: d.v.s, hh:00:02, hh:02:02, ...**
11) **Anvendt båndbredde: knap 6 Hz**
12) **Minimum S/N for reception: around -33 dB on the WSJT scale (2500 Hz reference bandwidth).**

WSPR Performance

Hvordan hævder WSPR sig i følsomhed med andre ”weak signal” Kommunikations modes? Under forudsætning af additive white gaussian noise, ingen QSB, og negligerbar Doppler spreading, gælder følgende:

Mode	Threshold S/N	Comments
CW	-18 dB	Best human operators
JT65B	-24	Koetter-Vardy (KV) decoder
JT65B	-27	Avg of 3 transmissions, KV decoder
JT65B	-28	Deep Search
WSPR	-29	
WSPR	-33	Avg of 3 transmissions

Det bør bemærkes at JT65 anvender 1-minut T/R sekvenser hvor WSPR anvender 2-minut sekvenser. WSPR signalets bånbredde er knap 6 Hz,
eller omkring 60 gange mindre end JT65B båndbredden.

WSPR QRGs
(USB dial frequency)

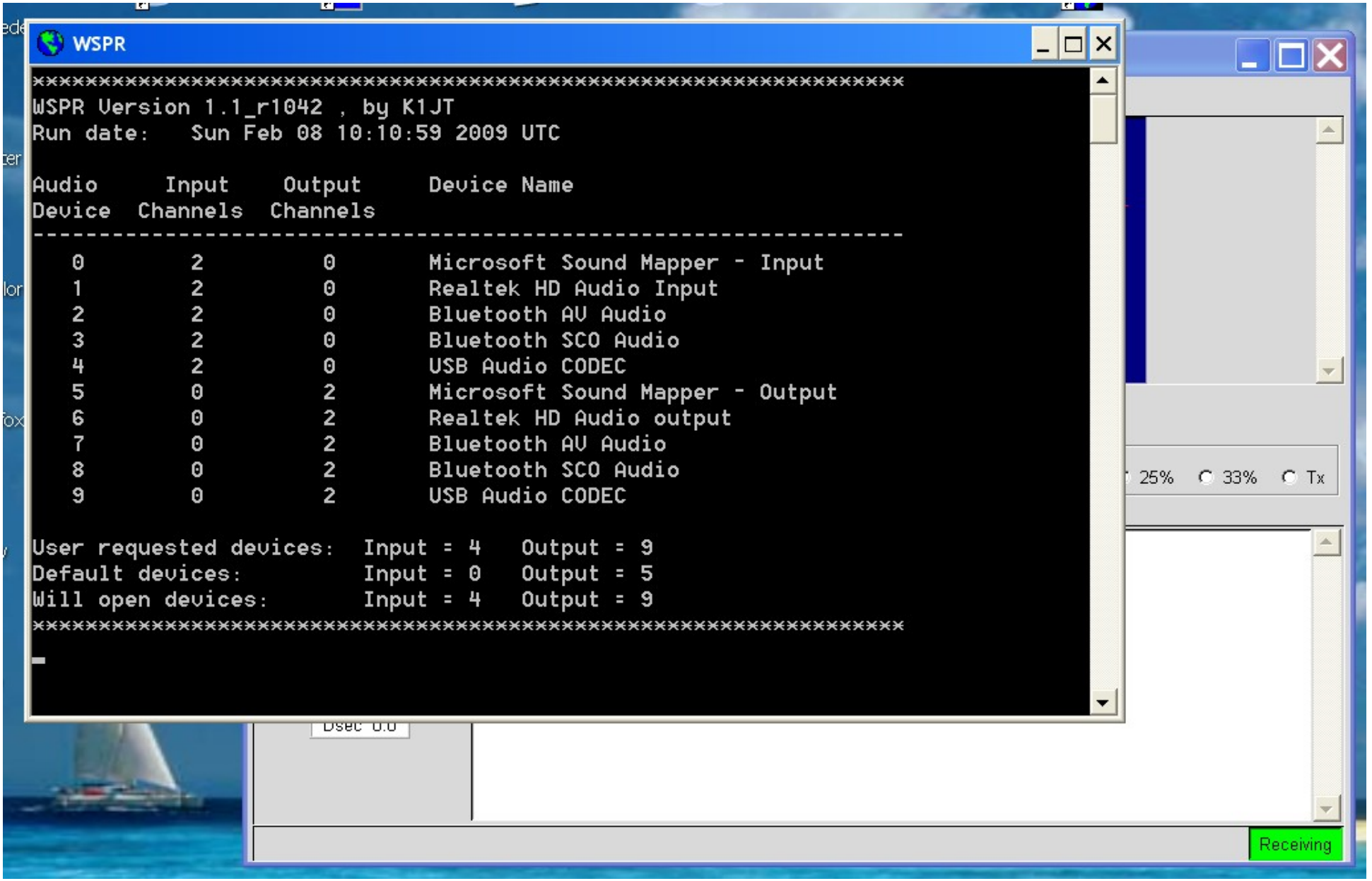
- 1.836,6
- 3.592,6
- 7.038,6
- 10.138,7
- 14.095,6
- 18.104,6
- 21.094,6
- 24.924,6
- 28.124,6
- 50.293,0

WSPR Konfiguration

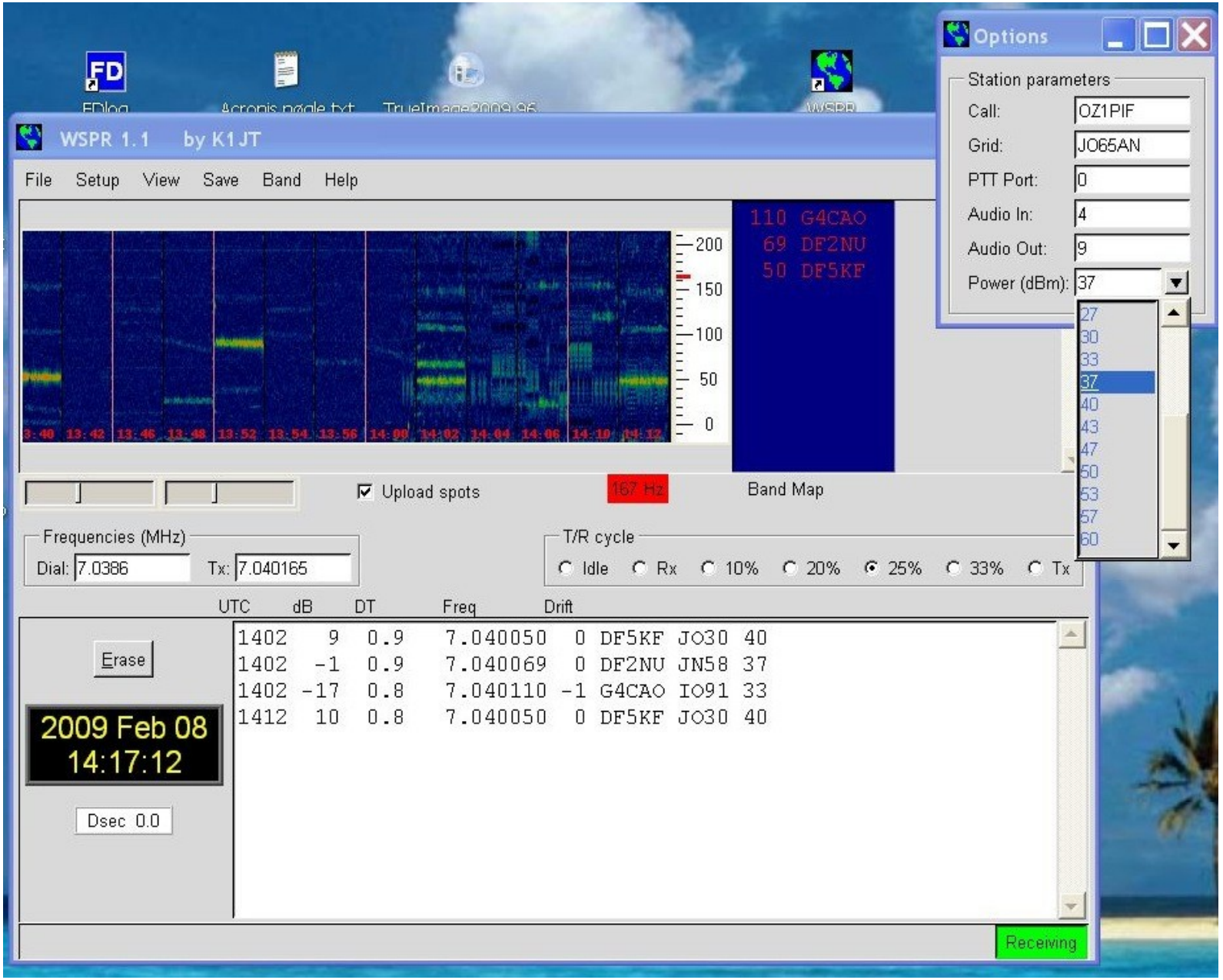
- Tryk F2, udfyld:
  - Kaldesignal
  - 6-tegn lokator
  - COM port for PTT (0 for VOX)
  - Audio in og audio out device
  - Transmitter power i dBm (1 W = 30 dBm)

- I programvinduet angives:
  - SSB transceiver dial frekvens (i MHz, USB)
  - Signal Tx frekvens (Rx frekv. + 1500 +/- 100 Hz)
  - eller (fra Version 1.1,) vælg Bånd fra menu

WSPR 1.1 i WindowsXP



WSPR 1.1 i WindowsXP



Hvad behøves?

- Rimelig frekvensstabil radio (2-5 ppm, gerne bedre)
- Computer med internetforbindelse; Windows XP, Vista eller Linux
- Præcis computer tid (Dimension4, http://www.thinkman.com/dimension4/)
- Galvanisk isoleret forbindelse mellem radio og computer

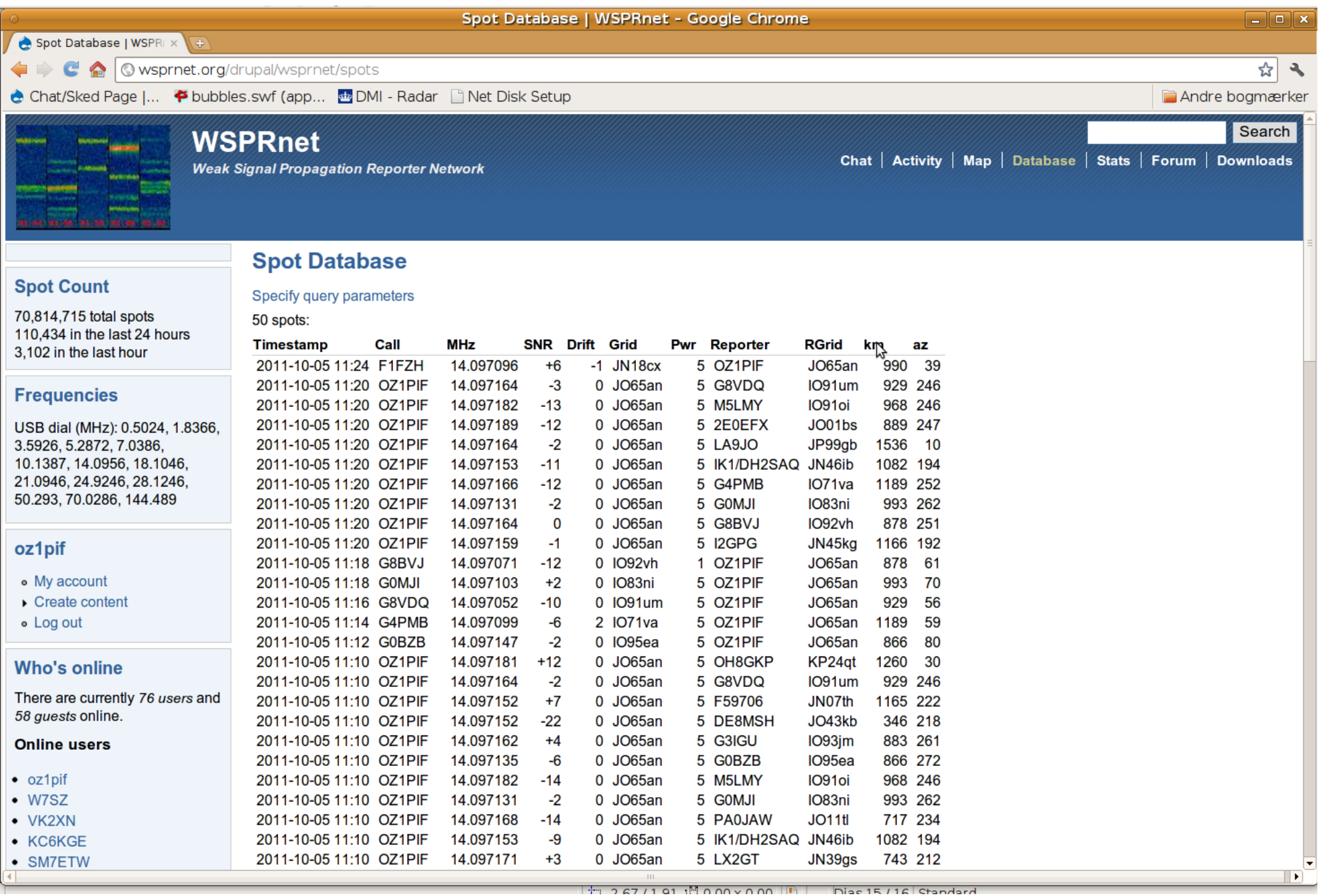
F.eks. USB Lydkort

http://www.tigertronics.com/

http://www.frenning.dk/OZ1PIF_HOMEPAGE/SignaLinkUSB-mods.html

WSPRnet.org

- Internet database over WSPR spots
- WSPR applikation uploader automatisk spots
- Indeholder også propagation map, forums, og user blogs


Spot Database | WSPRnet - Google Chrome
Spot Database | WSPR
wsprnet.org/drupal/wsprnet/spots
Chat/Sked Page |...
bubbles.swf (app...
DMI - Radar
Net Disk Setup
Andre bogmærker
WSPRnet
Weak Signal Propagation Reporter Network
Search
Chat | Activity | Map | Database | Stats | Forum | Downloads
Spot Count
70,814,715 total spots
110,434 in the last 24 hours
3,102 in the last hour
Frequencies
USB dial (MHz): 0.5024, 1.8366, 3.5926, 5.2872, 7.0386, 10.1387, 14.0956, 18.1046, 21.0946, 24.9246, 28.1246, 50.293, 70.0286, 144.489
oz1pif
My account
Create content
Log out
Who's online
There are currently 76 users and 58 guests online.
Online users
oz1pif
W7SZ
VK2XN
KC6KGE
SM7ETW
Spot Database
Specify query parameters
50 spots:
Timestamp Call MHz SNR Drift Grid Pwr Reporter RGrid km az
2011-10-05 11:24 F1FZH 14.097096 +6 -1 JN18cx 5 OZ1PIF JO65an 990 39
2011-10-05 11:20 OZ1PIF 14.097164 -3 0 JO65an 5 G8VDQ IO91um 929 246
2011-10-05 11:20 OZ1PIF 14.097182 -13 0 JO65an 5 M5LMY IO91oi 968 246
2011-10-05 11:20 OZ1PIF 14.097189 -12 0 JO65an 5 2E0EFX JO01bs 889 247
2011-10-05 11:20 OZ1PIF 14.097164 -2 0 JO65an 5 LA9JO JP99gb 1536 10
2011-10-05 11:20 OZ1PIF 14.097153 -11 0 JO65an 5 IK1/DH2SAQ JN46ib 1082 194
2011-10-05 11:20 OZ1PIF 14.097166 -12 0 JO65an 5 G4PMB IO71va 1189 252
2011-10-05 11:20 OZ1PIF 14.097131 -2 0 JO65an 5 G0MJI IO83ni 993 262
2011-10-05 11:20 OZ1PIF 14.097164 0 0 JO65an 5 G8BVJ IO92vh 878 251
2011-10-05 11:20 OZ1PIF 14.097159 -1 0 JO65an 5 I2GPG JN45kg 1166 192
2011-10-05 11:18 G8BVJ 14.097071 -12 0 IO92vh 1 OZ1PIF JO65an 878 61
2011-10-05 11:18 G0MJI 14.097103 +2 0 IO83ni 5 OZ1PIF JO65an 993 70
2011-10-05 11:16 G8VDQ 14.097052 -10 0 IO91um 5 OZ1PIF JO65an 929 56
2011-10-05 11:14 G4PMB 14.097099 -6 2 IO71va 5 OZ1PIF JO65an 1189 59
2011-10-05 11:12 G0BZB 14.097147 -2 0 IO95ea 5 OZ1PIF JO65an 866 80
2011-10-05 11:10 OZ1PIF 14.097181 +12 0 JO65an 5 OH8GKP KP24qt 1260 30
2011-10-05 11:10 OZ1PIF 14.097164 -2 0 JO65an 5 G8VDQ IO91um 929 246
2011-10-05 11:10 OZ1PIF 14.097152 +7 0 JO65an 5 F59706 JN07th 1165 222
2011-10-05 11:10 OZ1PIF 14.097152 -22 0 JO65an 5 DE8MSH JO43kb 346 218
2011-10-05 11:10 OZ1PIF 14.097162 +4 0 JO65an 5 G3IGU IO93jm 883 261
2011-10-05 11:10 OZ1PIF 14.097135 -6 0 JO65an 5 G0BZB IO95ea 866 272
2011-10-05 11:10 OZ1PIF 14.097182 -14 0 JO65an 5 M5LMY IO91oi 968 246
2011-10-05 11:10 OZ1PIF 14.097131 -2 0 JO65an 5 G0MJI IO83ni 993 262
2011-10-05 11:10 OZ1PIF 14.097168 -14 0 JO65an 5 PA0JAW JO11tl 717 234
2011-10-05 11:10 OZ1PIF 14.097153 -9 0 JO65an 5 IK1/DH2SAQ JN46ib 1082 194
2011-10-05 11:10 OZ1PIF 14.097171 +3 0 JO65an 5 LX2GT JN39gs 743 212

Web Ressourcer

- http://physics.princeton.edu/pulsar/K1JT/
  - WSPR application download
  - Quick Start guide

- http://WSPRnet.org/
  - Spot database
  - Propagation map
  - Forum
  - User blogs
  - Chat
  - Activity overview