

Yet more ways to waste time with
cheap SDRs

Ralph Adams VA7VZA

KARC monthly meeting February 2022

Or rather ...

Yet more ways to waste time with inexpensive SDRs

What is a Software Defined Radio (SDR)?

What is cheap?

Why are they called dongles?

Quick survey of what's available in the “cheap” range (under \$300 US).

Computers and software to use them.

What can you do with them?

Things I have tried.

Using an Android phone or tablet as a communications receiver.

Recording IQ spectrum for later review (MW DXing and SWLing).

Surveying and tracking down RFI.

Aircraft tracking ADS-B.

Weather Balloon-Radiosonde tracking.

Receiving and decoding APT imagery from weather satellites.

Things I am going to try.

Scanning VHF-UHF.

Meteor Scatter monitoring.

Diversity Reception.

KIWISDR network.



V3

RTL-SDR.COM

QUICKSTART SETUP GUIDE: RTL-SDR.COM/DSG
DVB-T + DAB + FM + SDR
RTL2832U R820T2 TCXO + BIAS T + HF

CE FCC

NESDR SMArtEE XTR

Pro Stick Plus V1.0 ADS-B/Mode S Receiver
R820T2 + RF Amp + 1090 MHz Filter
<https://flightaware.com/ladsb/prostick>

FlightAware

\$30



\$120

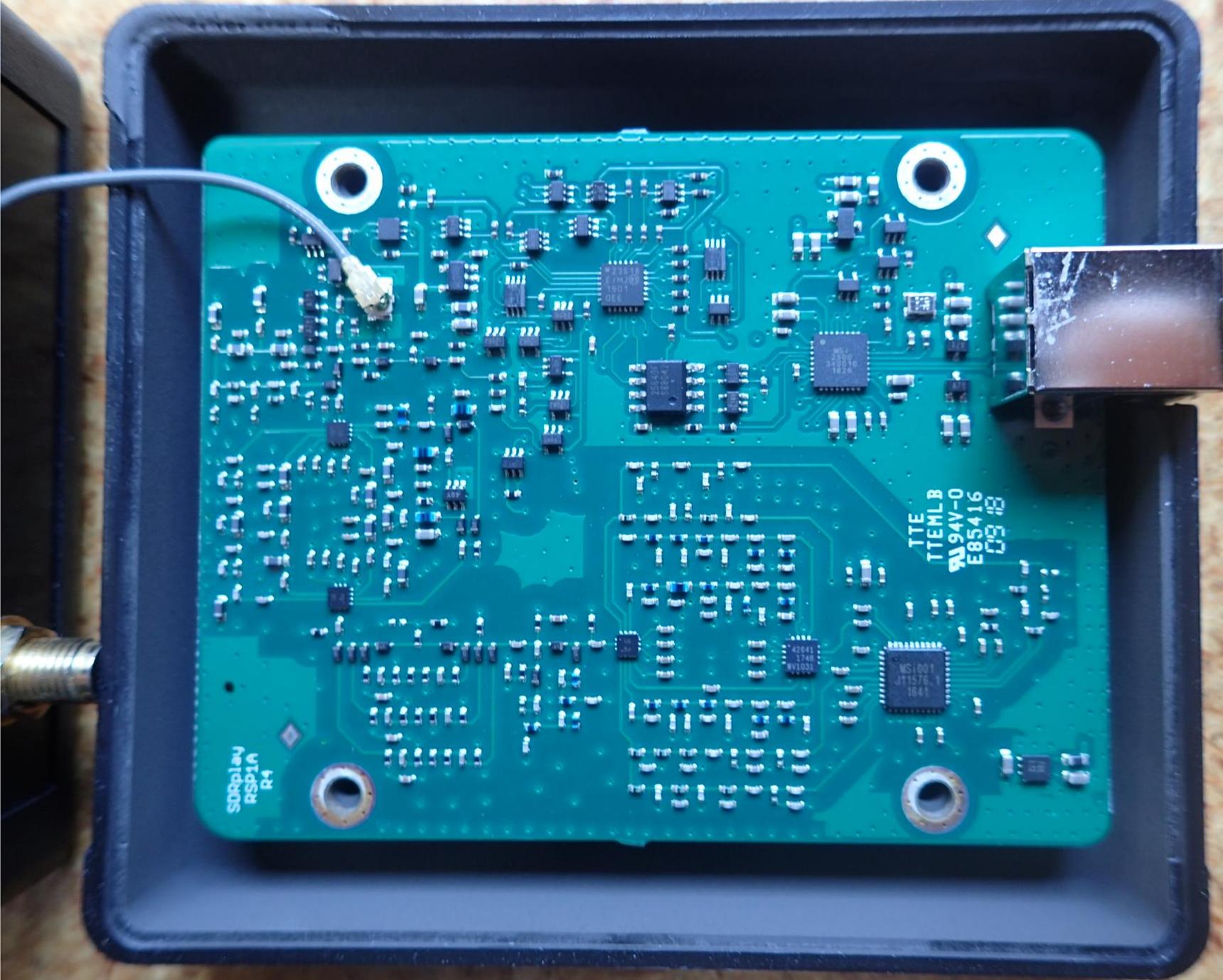


\$42



\$30





SDPlay
R4

TTE
TTEMLB
W94V-0
E85416
09 18

MS1001
J11576.1
1641

42041
1748
K10531

But there are many others:

HackRF One (\$295), but will transmit 1 – 30mW from 1 MHz up to 6GHz. 8bit.

Blade RF (\$420) 300MHz to 3.9GHz. 12bit.

Winradio Excalibur (\$950) 9kHz – 50MHz, 16bit.

Perseus (\$740) 10Hz to 30Mz. 14bit. Used with Jaguar software, developed by third party, considered the best MW DX system by many.

SDR Software

The big three:

SDR# (Windows, free), written by Airspy, does not support SDRPlay receivers.

SDRUno (Windows, free), derived from Studio1, now part of SDRPlay (supports dual coherent receivers, diversity reception)

HDSDR (Windows, free), derived from Winrad, now community supported.

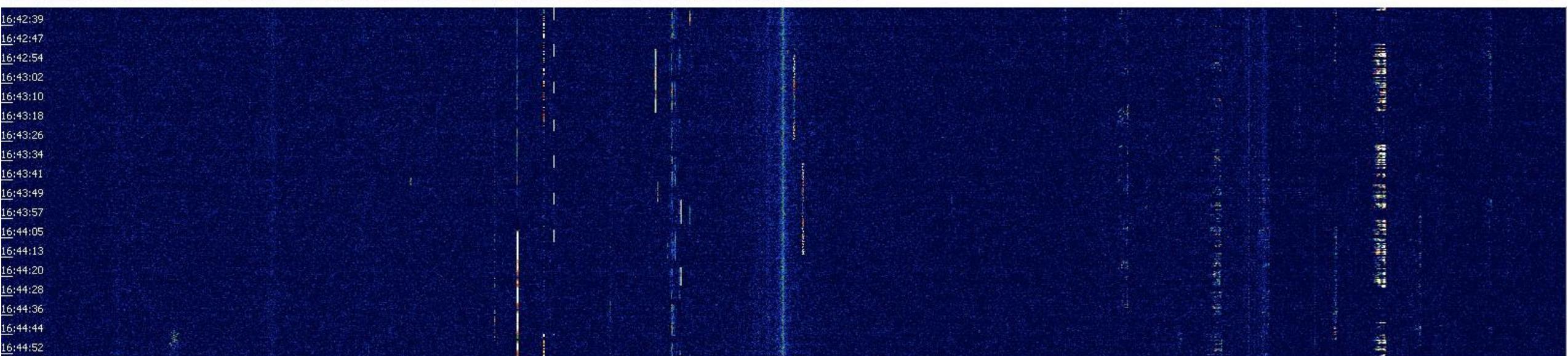
The others:

SDRconsole (Windows, free).

CubicSDR (Windows/Linux/Mac, will run on Rpi)

GQRx (Linux/Mac, will run on Rpi)

SDR++ (Windows/Linux/Mac)



AM ECSS FM LSB USB CW DRM

LO A **0007.100.000** FreqMgr
 Tune **0007.236.000** ExtIO
 Volume _____
 AGC Thresh. _____

S9 +23 dB

Soundcard [F5] ▶ ⏸ ⏹ ⏪ ⏩
 Bandwidth [F6] ⏪ ⏩
 Options [F7] ⏪ ⏩
 Help / Update [F1] ⏪ ⏩
 Full Screen [F11] ⏪ ⏩

NR NB RF NB IF AFC
 Mute AGC Slow Notch ANotch

Stop [F2] ⏪ ⏩
 Minimize [F3] ⏪ ⏩
 Exit [F4] ⏪ ⏩

2/2/2022 16:44:56
 CPU HSDSDR: 13%
 CPU Total: 75%

Waterfall Spectrum RBW 30.5 Hz 4 Avg Zoom Speed

Waterfall Spectrum RBW 1.5 Hz 1 Avg Zoom Speed

SETT. MA PLUGINS **SDRuno** MAIN V1.41.1

Final SR: 10000000
IFBW: 8.000MHz (ZIF)
Gain: 46.3dB

SR (MHz) 10.0
DEC 1

NOTCHES MW/FM DAB
IF MODE ZIP

Sdr: 24% Sys: 40% SAVE WS large_screen

SETT. RDSW EXW **SDRuno** RX CONTROL RSYN1 MCTR TCTR 0-00

DEEMPH STEP: 5 kHz 5.000000 -97.6 dBm RMS

MODE AM SAM FM CW DSB LSB USB DIGITAL

VFO A QM FM MODE CW OP FILTER NB NOTCH
A > B NFM MFM CWPK 6000 8000 NBW NCH1

VFO B B > A WFM SWFM ZAP 11K 20K NBN NCH2

QMS QMR CWAFNC NR NBOFF NCH3

MUTE -112 dBm AGC NCH4

SQLC OFF FAST NCHL

VOLUME MED SLOW

SETT. EXW **SDRuno** EX CONTROL

BW FREQ BW FREQ
N1 50 1000.0 N3 50 1900.0
N2 50 1500.0 N4 50 2500.0

AM SOFT FILTER SOFT FC 3300

AGC 58

NB 168

NR 177

CWPK 98

FM DEEM OFF 50uS 75uS LC 300

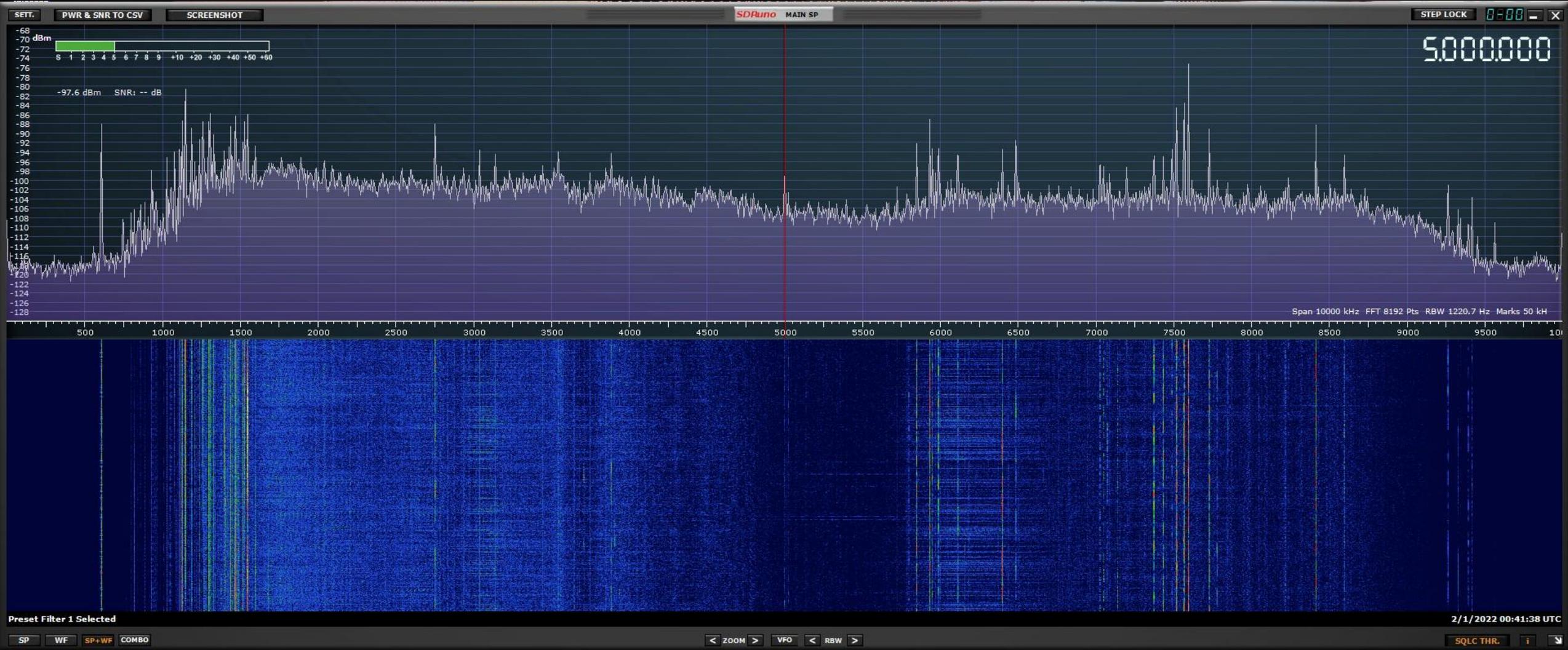
AFC MONO FMS-NR PDBPF HC 3000

FMS-NR 40

SETT. F FMAF **SDRuno** AUX SP 0-00

Span 14.5 kHz FFT 1024 Pts RBW 11.72 Hz Marks 200 H

SP WF SP+WF ZOOM



Android Phones and Tablets as receivers.

Reason for Android only is that there is something in iOS that prevents this type of application which uses an external device, the SDR.

RFAnalyzer (free): supports RTL-SDR and NSDR dongles for VHF, UHF.

SDRTouch (\$12C): supports RTL-SDR and NSDR, able to use RTL-SDR in direct sampling mode so that HF can be tuned.



16:52

RF Analyzer



wide FM

[Hz]



-10

-20

93.7

93.8

93.9

94

94.1

94.2

94.3

94.4

94.5

-38.4 dB
170 kHz

RTL-SDR (R820T) at 127.0.0.1:1234
tuned to 94.099998 MHz
offset=0.000000 MHz
ppm=0
demod at 94.099998 MHz

SAMSUNG

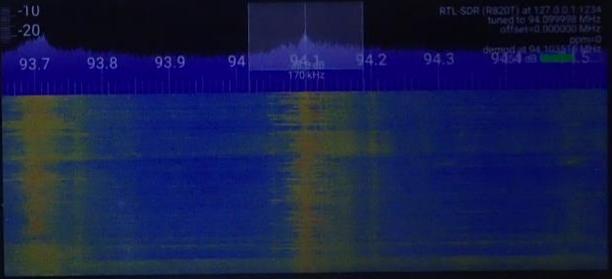


RTL-SDR.COM

QUICKSTART SETUP GUIDE: RTL-SDR.COM/OSG
DVB-T+DAB+FM+SDR
RTL2832U R820T2 TCXO+BIAS T+HF

16:53

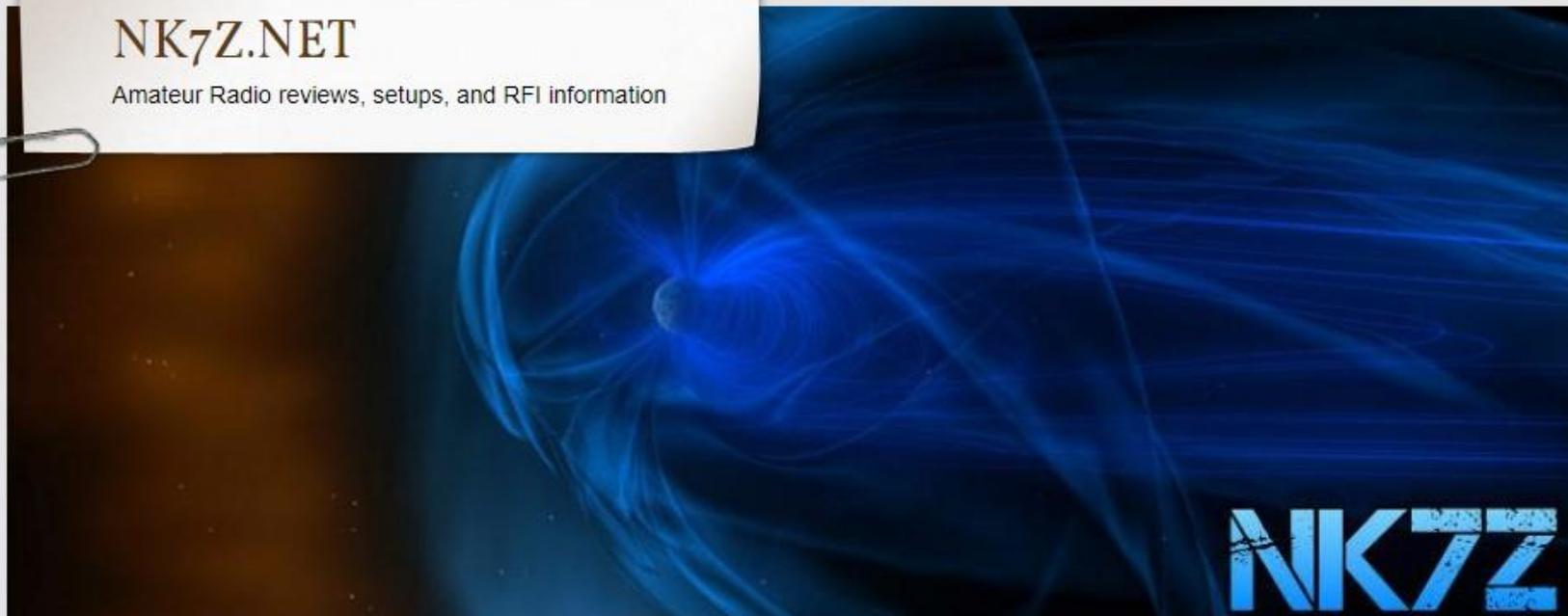
RF Analyzer



IQ Spectrum Recording for SWL and MW DX



RFI Survey and Tracking

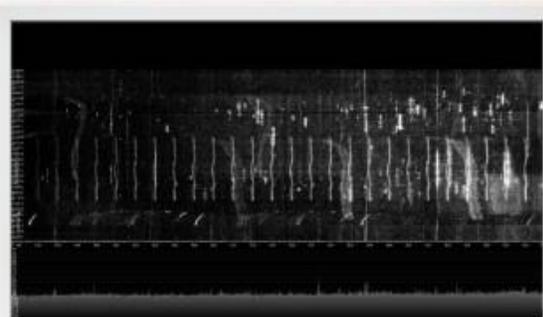


Using a SDR as a RFI site survey tool

Posted by [Dave](#) on September 7, 2016

 21466 total views , 1 views today

Overview



Twenty Four hours of RFI on 80 Meters

This is Part One of a [multi part article](#) dealing with setting up a SDR as a RFI site survey tool to assist in RFI detection, location, and mitigation. Further, part one will set the stage for how captures of the RFI were accomplished, and visualized. Part one will also touch upon some of what can be seen and learned from this data. Methods I used to [locate RFI can be found here](#). Also some [RFI sources signatures have been captured here](#).

Part two will deal with interpretation of the SDR

Top Posts & Pages

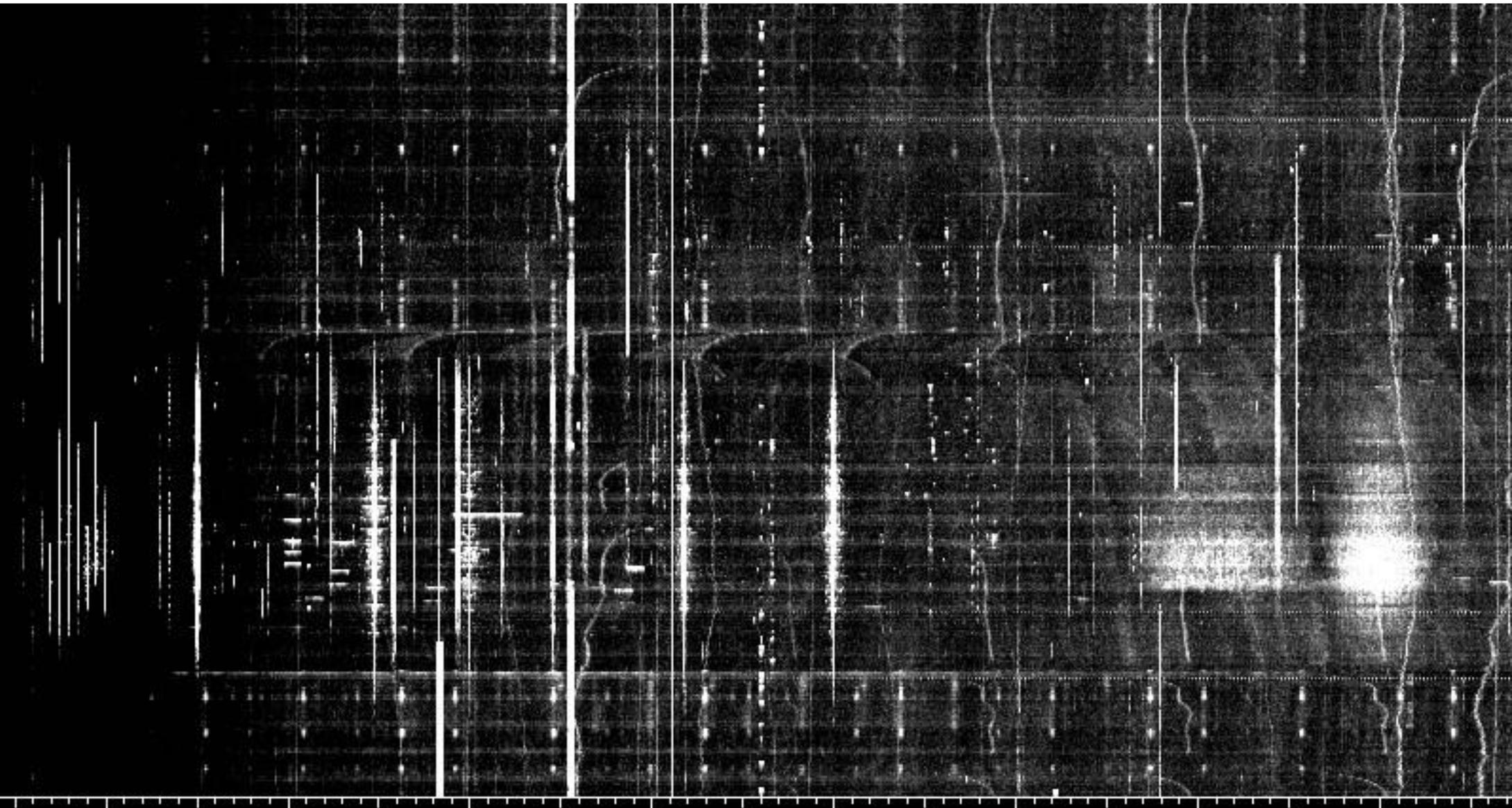
- Notes on tuning a Hustler 6BTV
- RFI Snapshots
- Using a SDR as a RFI site survey tool
- Rebuilding the Shack-- from scratch
- NI4L's 7 Band OCF Dipole

Search Site

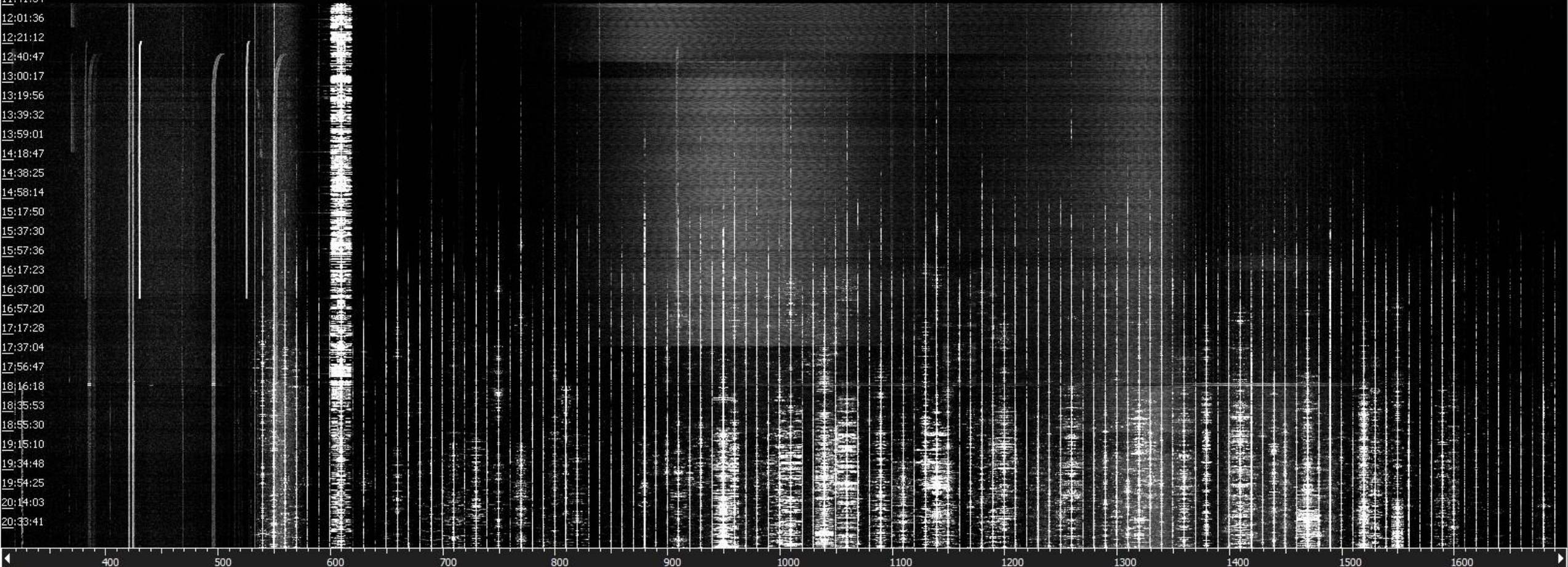
Search

Sponsors:

20:29:04
21:43:13
22:57:21
00:11:30
01:25:38
02:39:46
03:53:55
05:08:03
06:22:12
07:36:20
08:50:28
10:04:37
11:18:45
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18:43:36
19:57:44
21:11:53



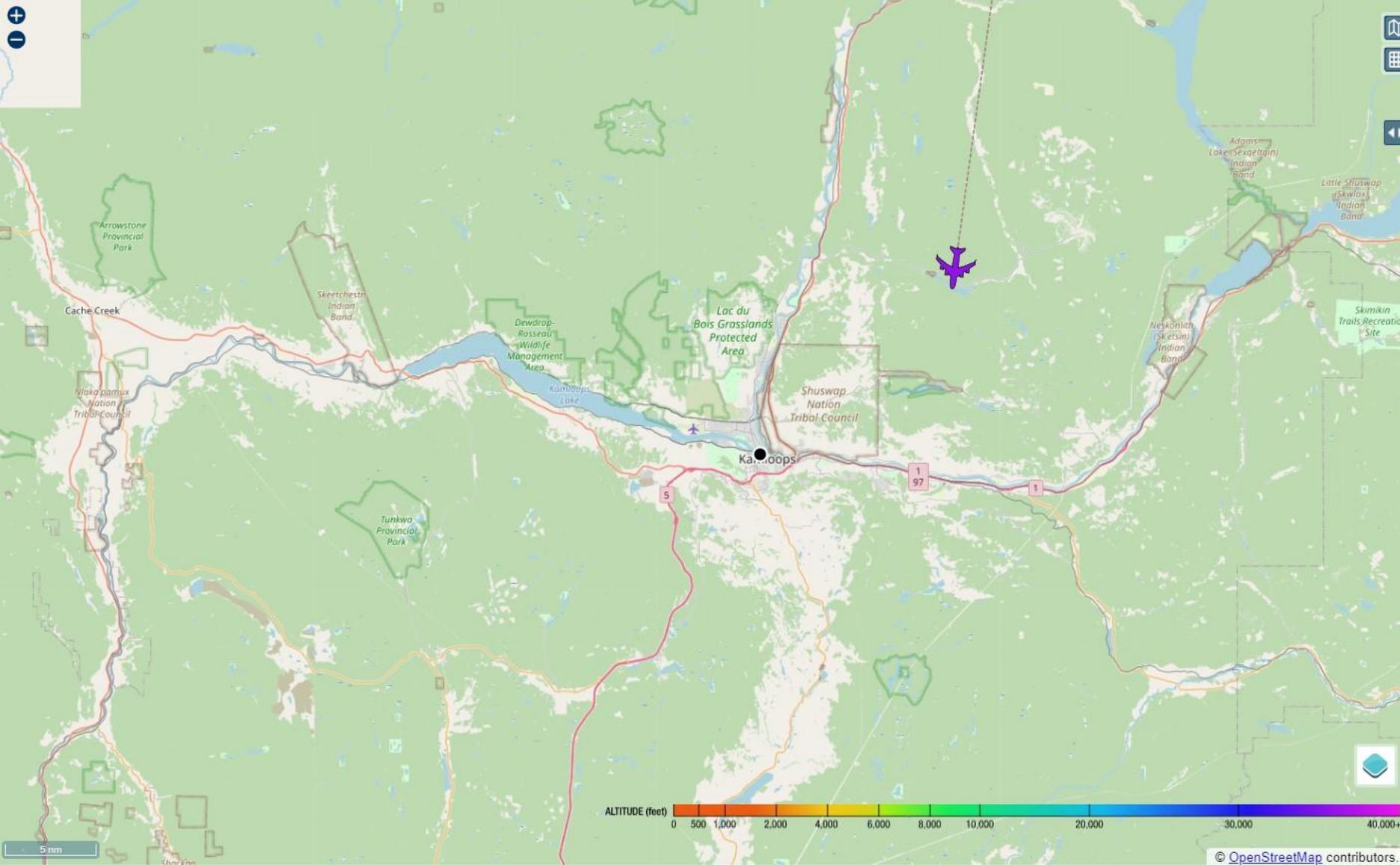
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14:38:25
14:58:14
15:17:50
15:37:30
15:57:36
16:17:23
16:37:00
16:57:20
17:17:28
17:37:04
17:56:47
18:16:18
18:35:53
18:55:30
19:15:10
19:34:48
19:54:25
20:14:03
20:33:41



400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600

ADS-B Aircraft tracking





SkyAware 5.0

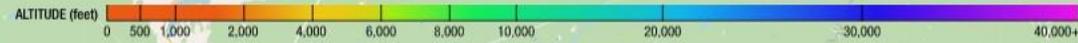
Total Aircraft: 1
With Positions: 1
Position History: 11

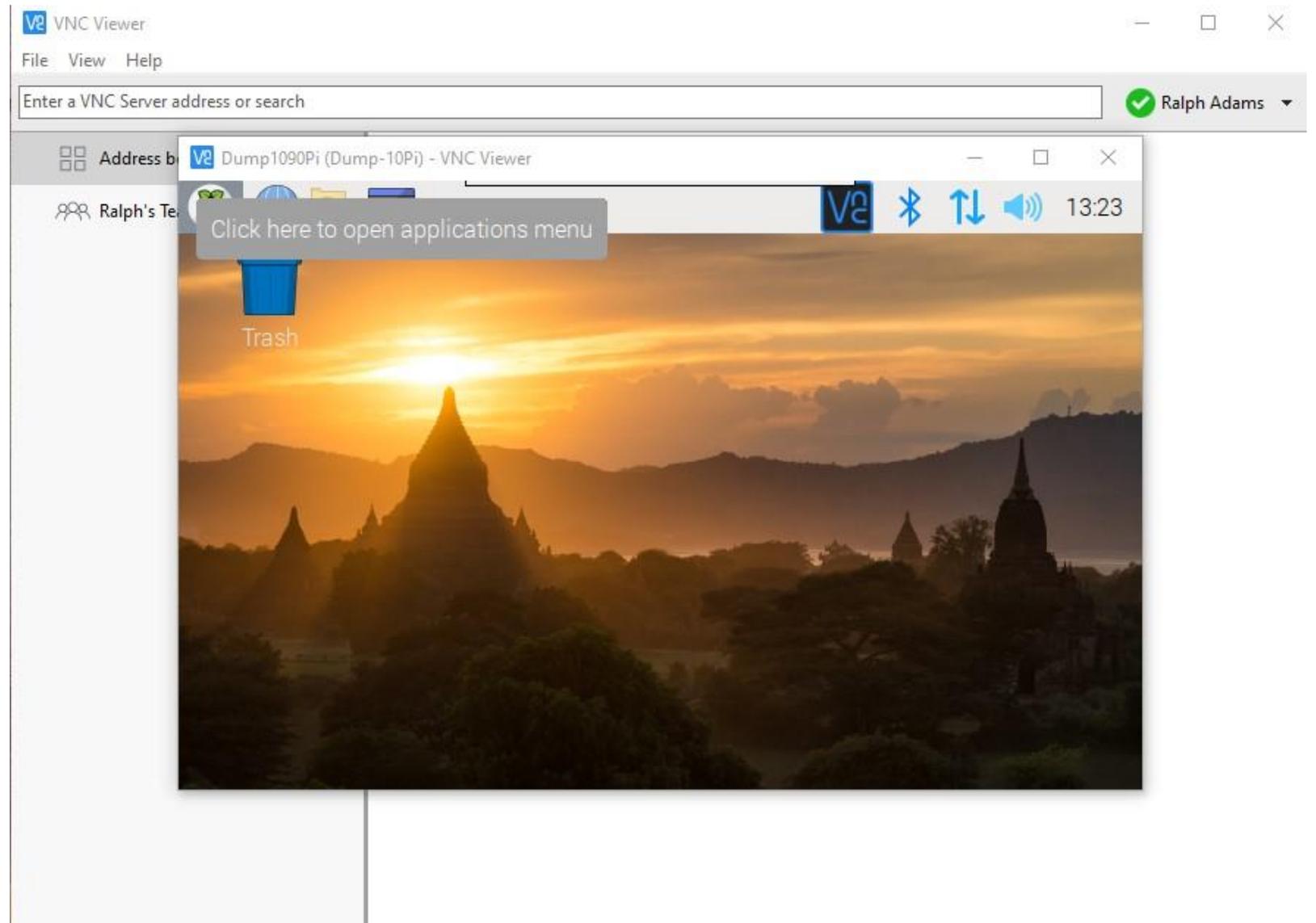
ADS-B Message Rate: 0.4/sec
UAT Message Rate: 0.0/sec

Filters (0 Enabled) Select Columns

Ident	Altitude (ft)	Speed (kt)	Distance (NM)	Heading	Msgs	Age
CLX89J	35,000	555	15.0	188°	178	4

- ADS-B
- UAT
- MLAT
- Other
- TIS-B



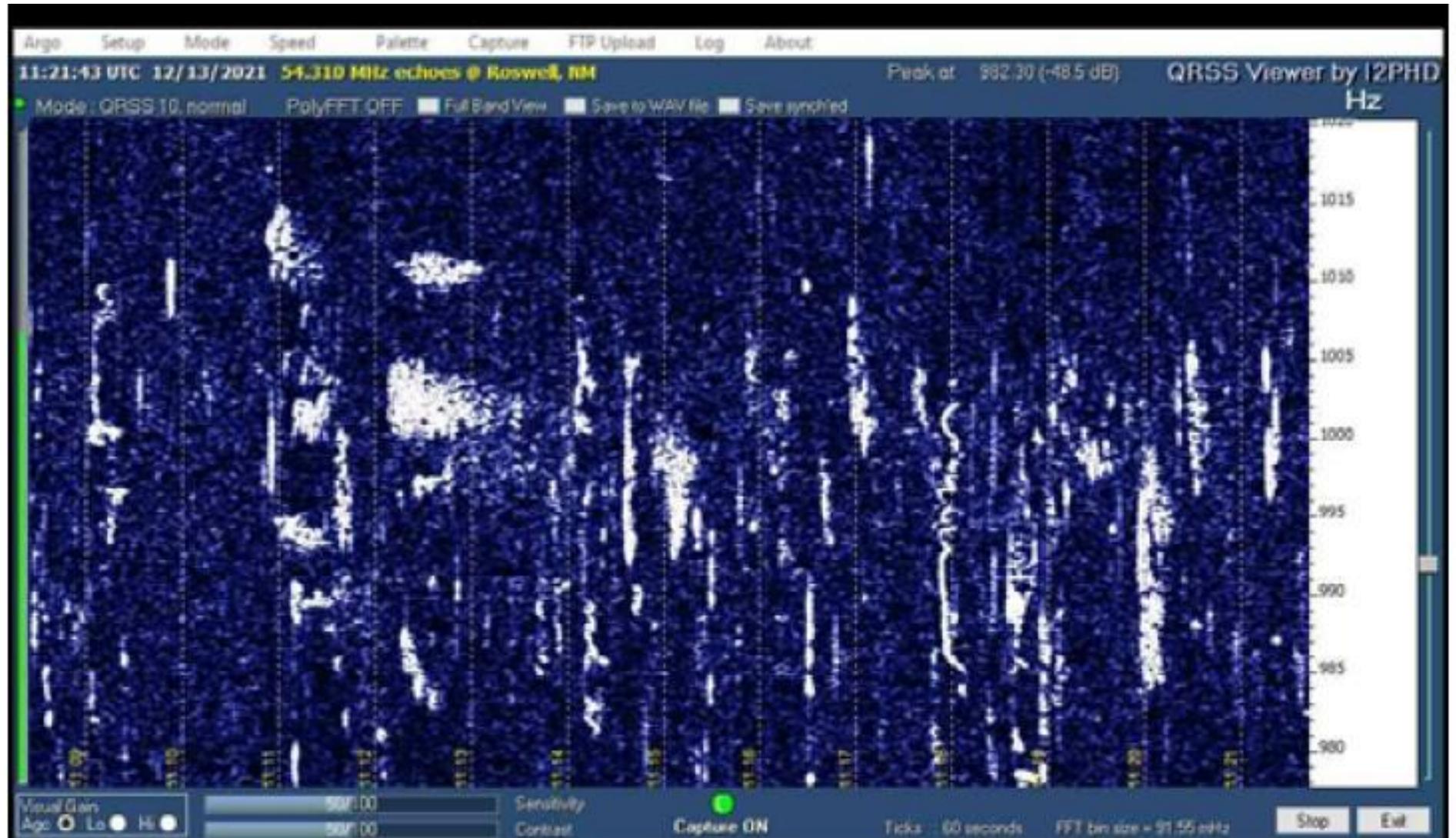


Amateur Radio Astronomy

Hydrogen Line observations

Meteor Scatter Monitoring

roswellmeteor.com



Diversity Reception

Ham Radio
Workbench



Diversity Reception Primer

John VE6EY

Making It Up

<http://play.fallows.ca>

Making It Up

ENJOYING RADIO AND MAKER HOBBIES

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NOVEMBER 13, 2021

Diversity Reception Primer – Improving Radio Reception



It started nearly a century ago, with efforts to reduce the effects of multipath fading. Here's the complete diversity reception primer.

Articles in this Series

[Make SWL Great Again with RSPduo](#)

[Diversity Reception Investment](#)

[Year in Review 2020 Diversity Reception](#)

[Ham Transceiver Diversity Reception – Current State](#)

[Build Your Own Diversity Reception System Under \\$700](#)

[ANAN versus RSPduo on HF – Surprising Results](#)

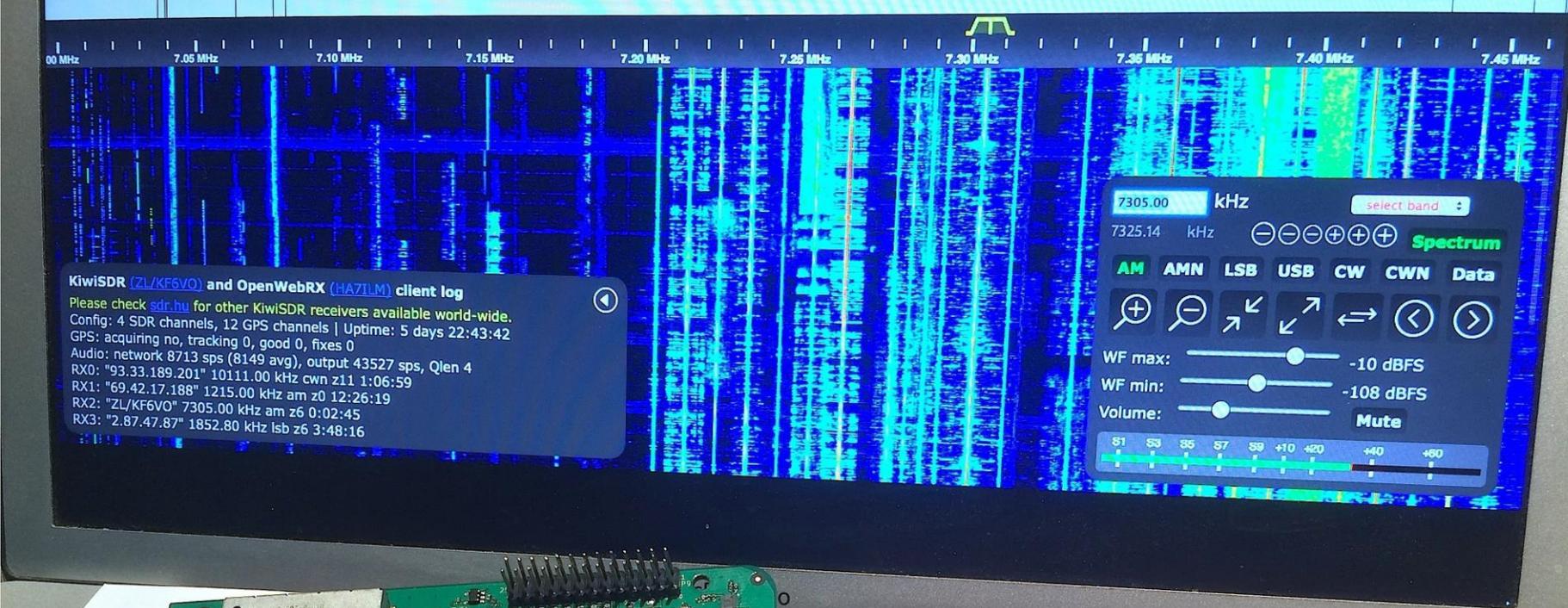
[Diversity Reception Primer – Improving Radio Reception](#)

Recent Articles

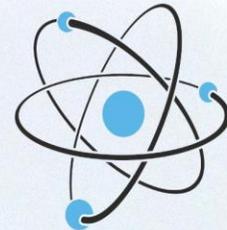
[3D Printing Start-up at VE6JF](#)

[Grey Line Propagation – Sunset in Madagascar](#)

KIWISDR network

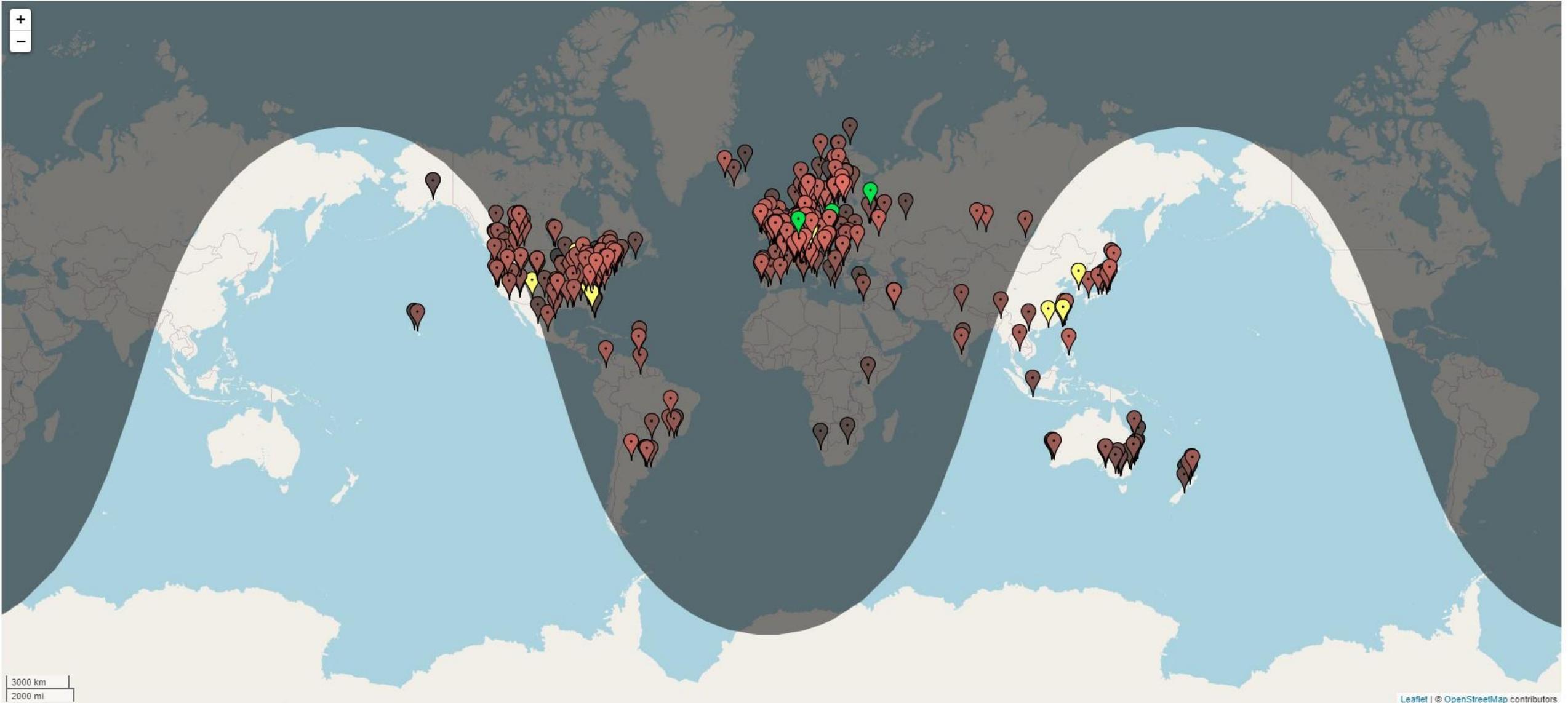


© bluebison.net



ValentFX
ELECTRONICS INNOVATION

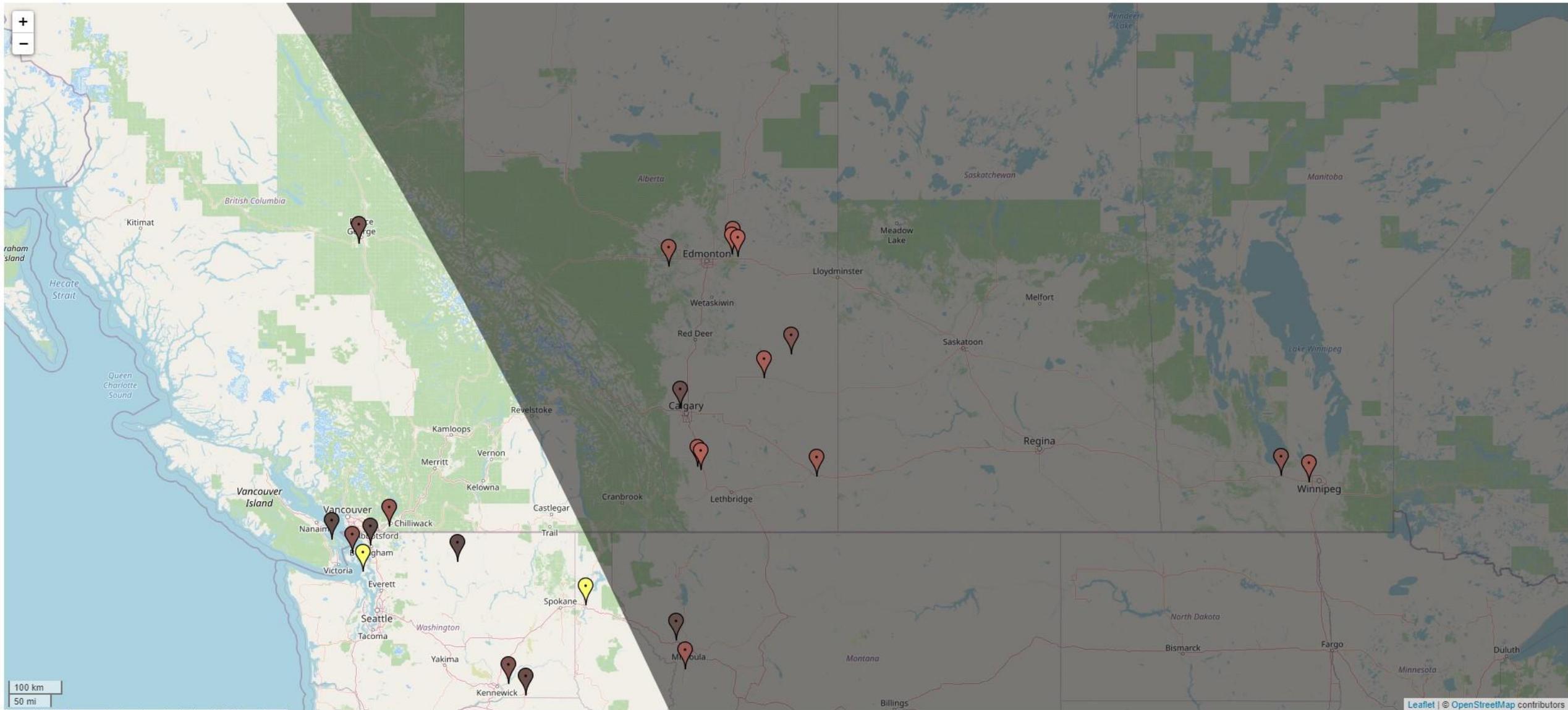
KiwiSDR for BeagleBone

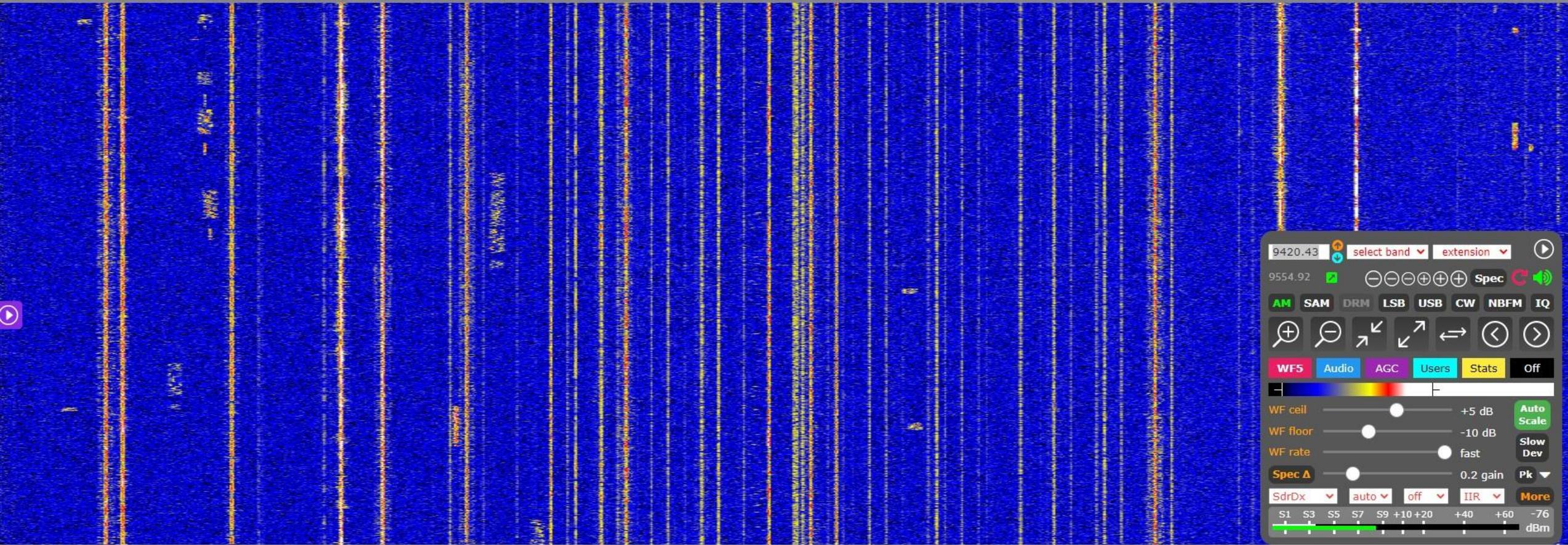


3000 km
2000 mi

Rendered with [dynamov map maker](#), dynamic receiver data from [KiviSDR.com](#) | [Legend](#)

Leaflet | © OpenStreetMap contributors





9420.43

9554.92

+5 dB

-10 dB

fast

0.2 gain

S1 S3 S5 S7 S9 +10 +20 +40 +60 -76 dBm



KiwiSDR: Software-defined receiver

Prince George, British Columbia, Canada | Grid [CO82ot](#), ASL 784 M, [[map](#)], SNR 28:22 dB

[@bluebison.net](#) Antenna: 80 Meter full size horizontal loop at 8 meters. Reflector loop at 1 meter.

VE7AV

Your name or callsign:

VA7VZA

00:48 UTC

16:48 Local

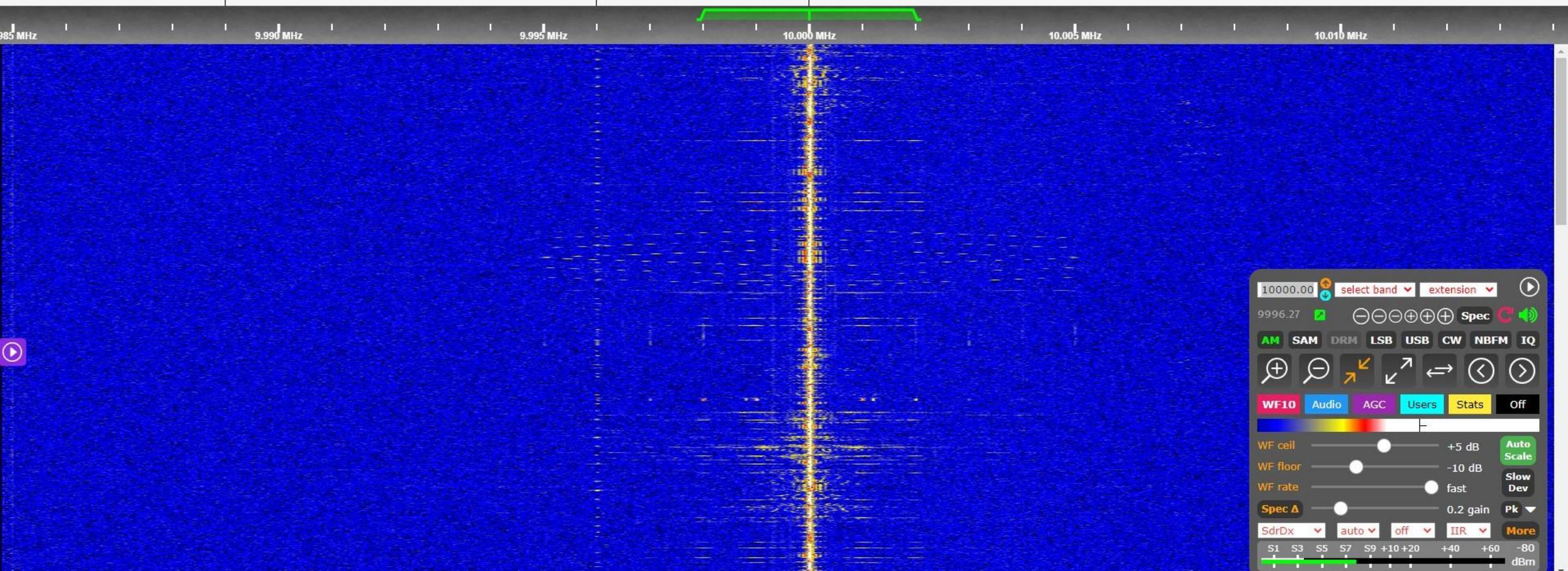
America/Vancouver (PST)

FSK

RWM RUS

wwwvh / wwwv

BPM



10000.00 select band extension

9996.27

AM **SAM** **DRM** **LSB** **USB** **CW** **NBFM** **IQ**

WF10 **Audio** **AGC** **Users** **Stats** **Off**

WF ceil +5 dB

WF floor -10 dB

WF rate fast

Spec 0.2 gain

SdrDx auto off IIR

S1 S3 S5 S7 S9 +10 +20 +40 +60 -80 dBm

UTC time

02:14:28

Thursday, January 20, 2022

Moscow time

05:14:28

Thursday, January 20, 2022

FAQ in description!

Every ~30 minutes, the stream will automatically reload the remote receiver's website. When that happens, it will go black for a short time.

