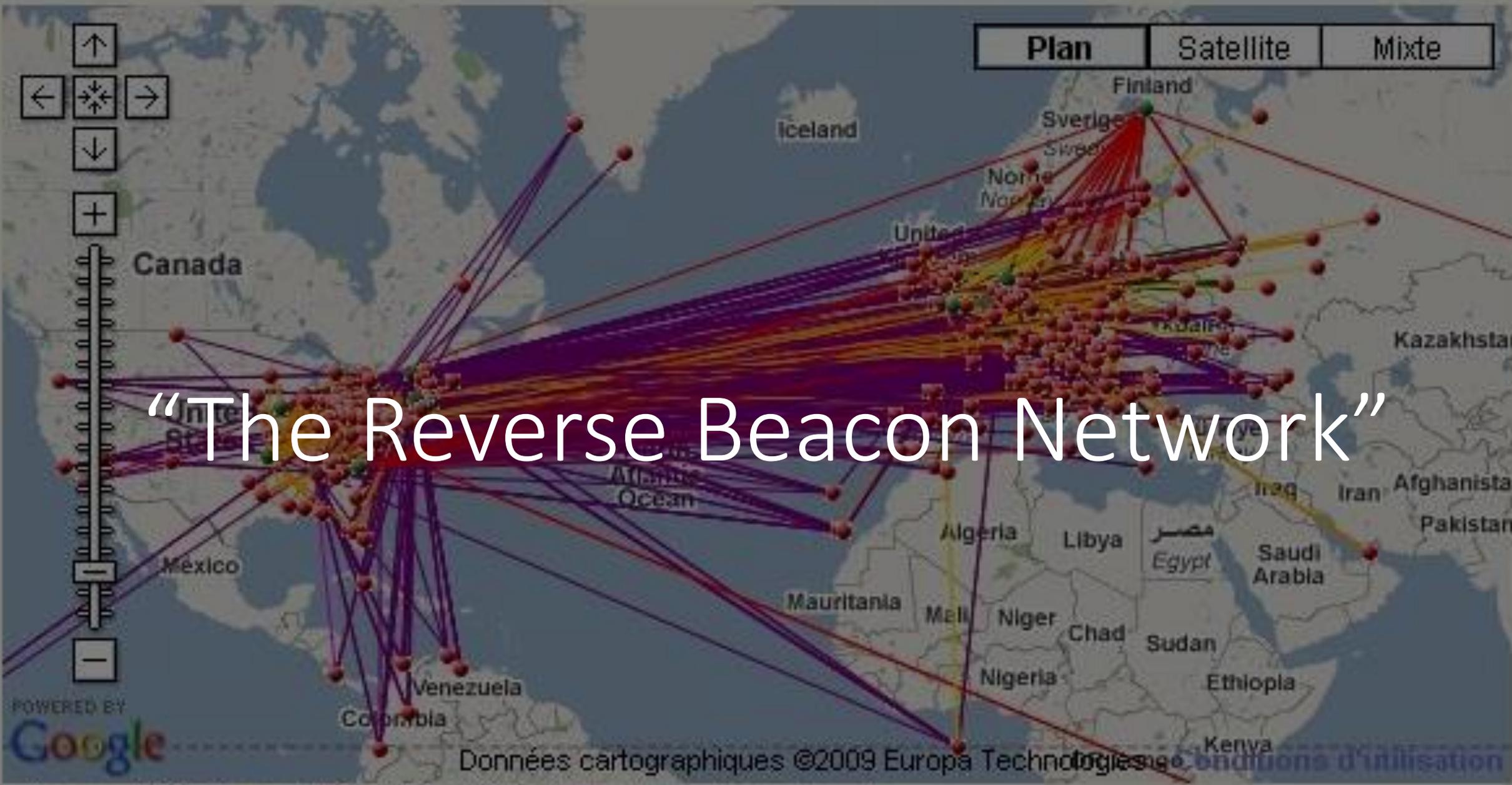


Shortwave robots,
reverse beacons, and an
exotic fruit



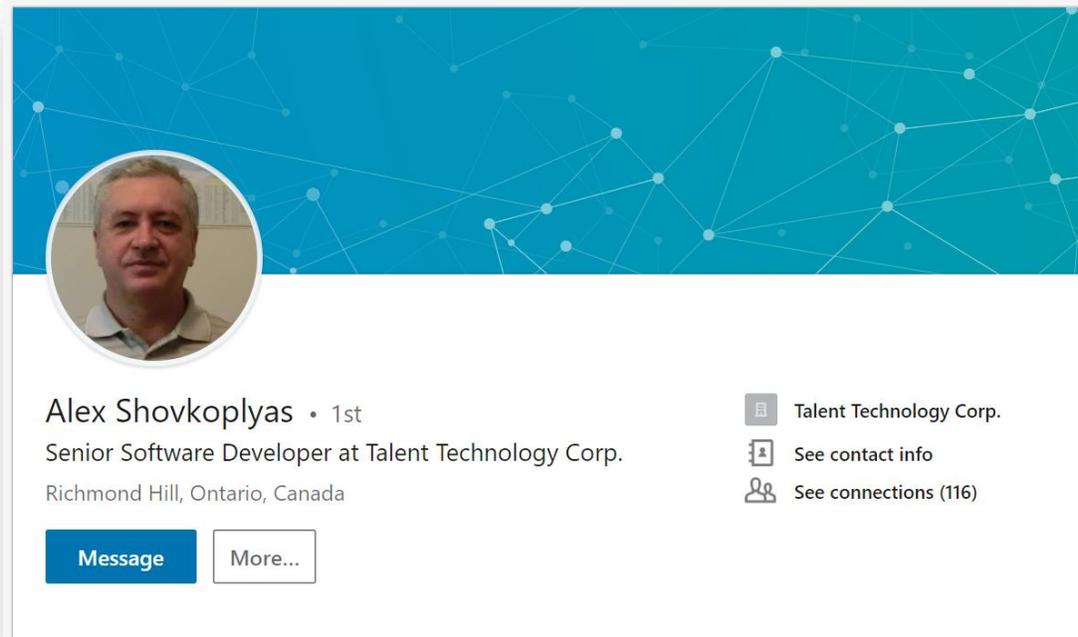
Beacons?

NCDXF/IARU International Beacon Project
Transmission Schedule



It started with one brilliant engineer...

Alex Shovkopyas, VE3NEA (b. 1965,
ex-UR5EMI, Canadian resident since 1998)
"Canadian ham of the year" 2014



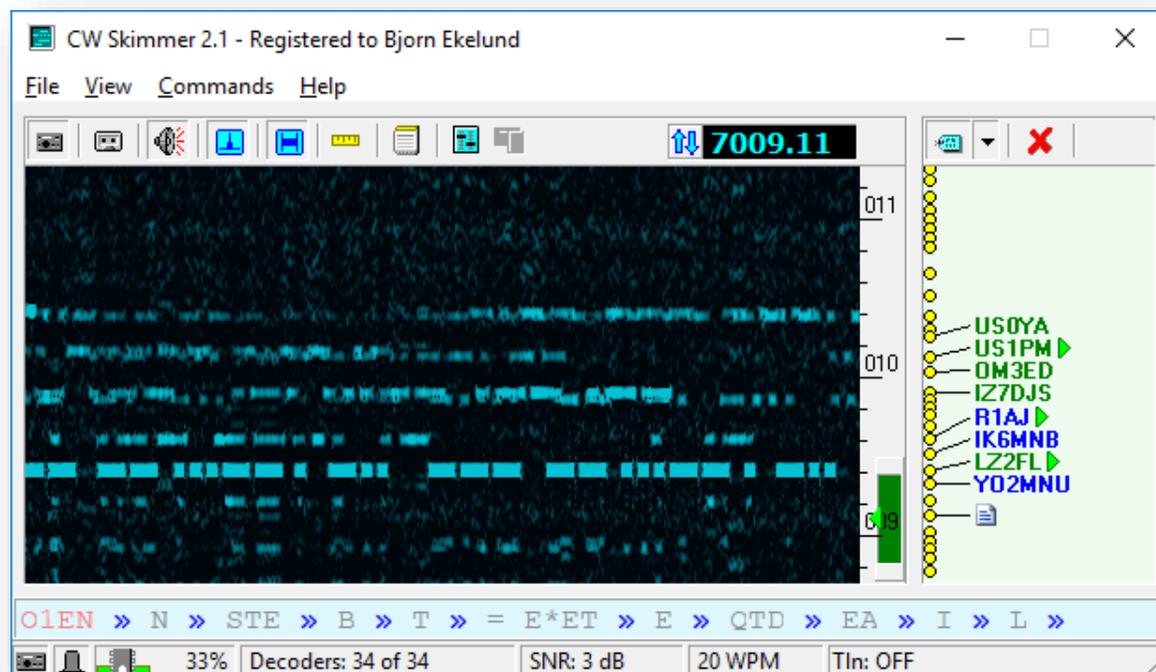
Alex Shovkopyas • 1st
Senior Software Developer at Talent Technology Corp.
Richmond Hill, Ontario, Canada

[Message](#) [More...](#)

[Talent Technology Corp.](#)
[See contact info](#)
[See connections \(116\)](#)

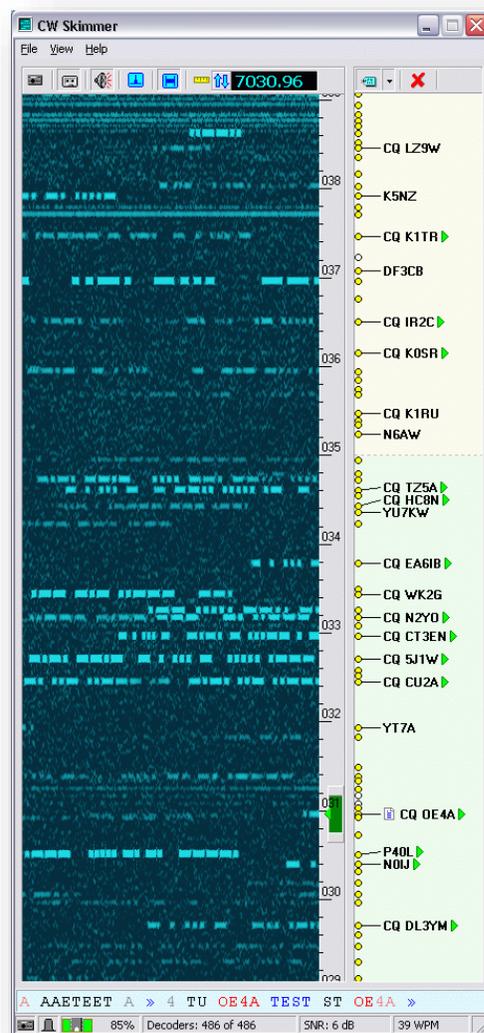


Morse code decoder "CW Skimmer"



Published by Alex in 2008 after "seven years of thinking".
Based on Bayesian statistics, a "kind of" AI.
Originally intended as a tool to manage DX pile-ups.

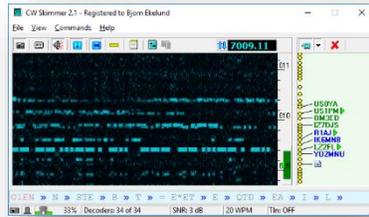
“CW Skimmer”



- Works with a range of SDR front-ends
- Parallel decoding of Morse code signals across an entire passband
 - Standard 3.5kHz audio
 - Wideband I-Q up to 192kHz bandwidth
- Graphical “waterfall” illustration of signals
- Uses a recognized call sign data base for sanity checking

2008: The planets lined up...

Alex VE3NEA



Felipe PY1NB

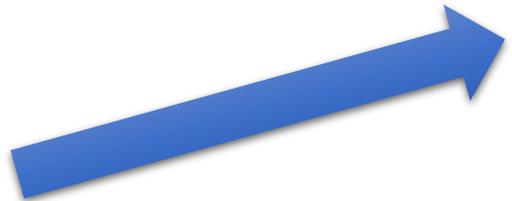


Dick W3OA



Nick F5VIH

Pete N4ZR



Phil N8VB



REVERSE BEACON NETWORK

welcome | main | dx spots | skimmers | downloads | about | contact us

Map | Satellite | Hybrid



POWERED BY Google

[world wide](#) / [zoom to US](#) / [zoom to Europe](#) / [zoom to North Atlantic](#)

[show/hide my last filters](#)

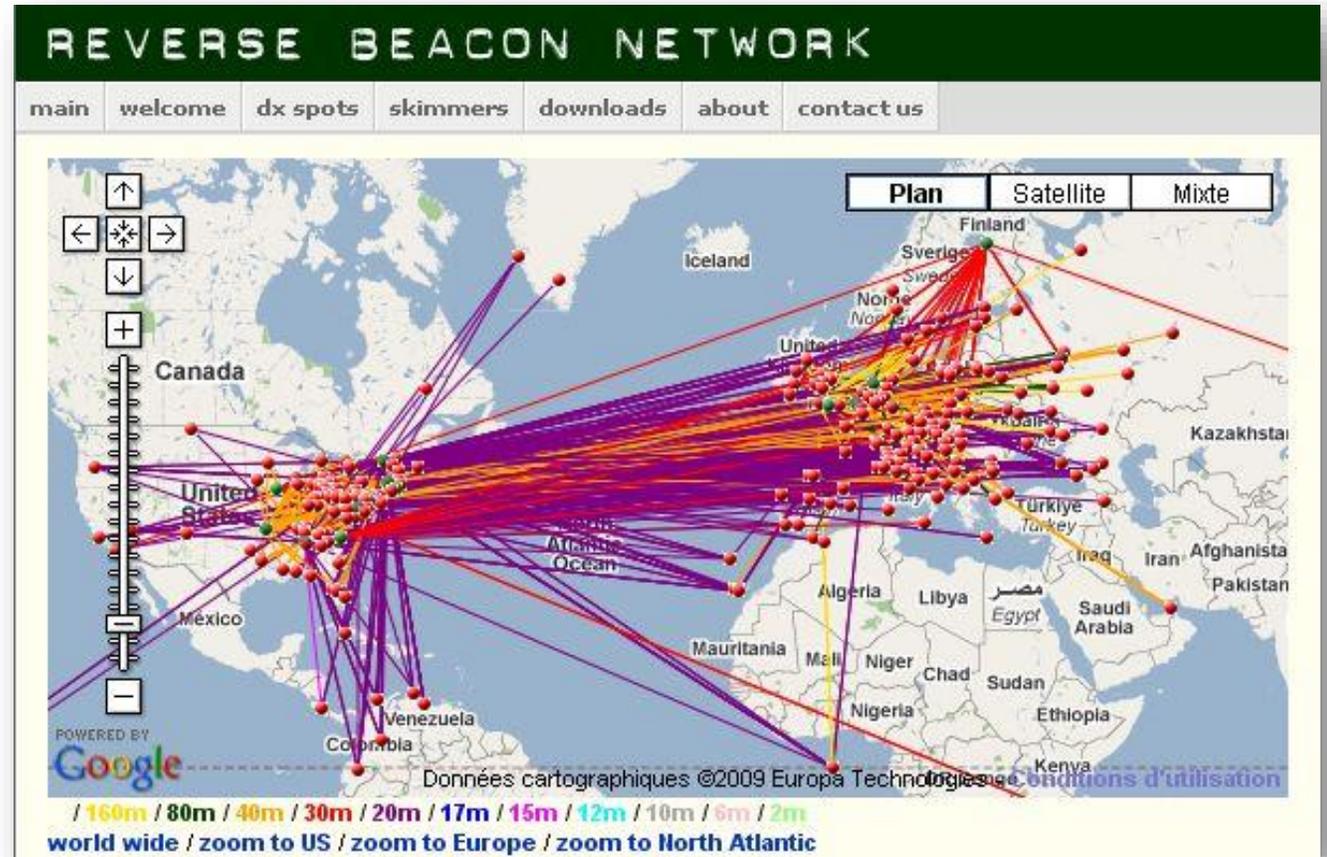
showing spots for DX call: LA3ZA rows to show: 50

search spot by callsign

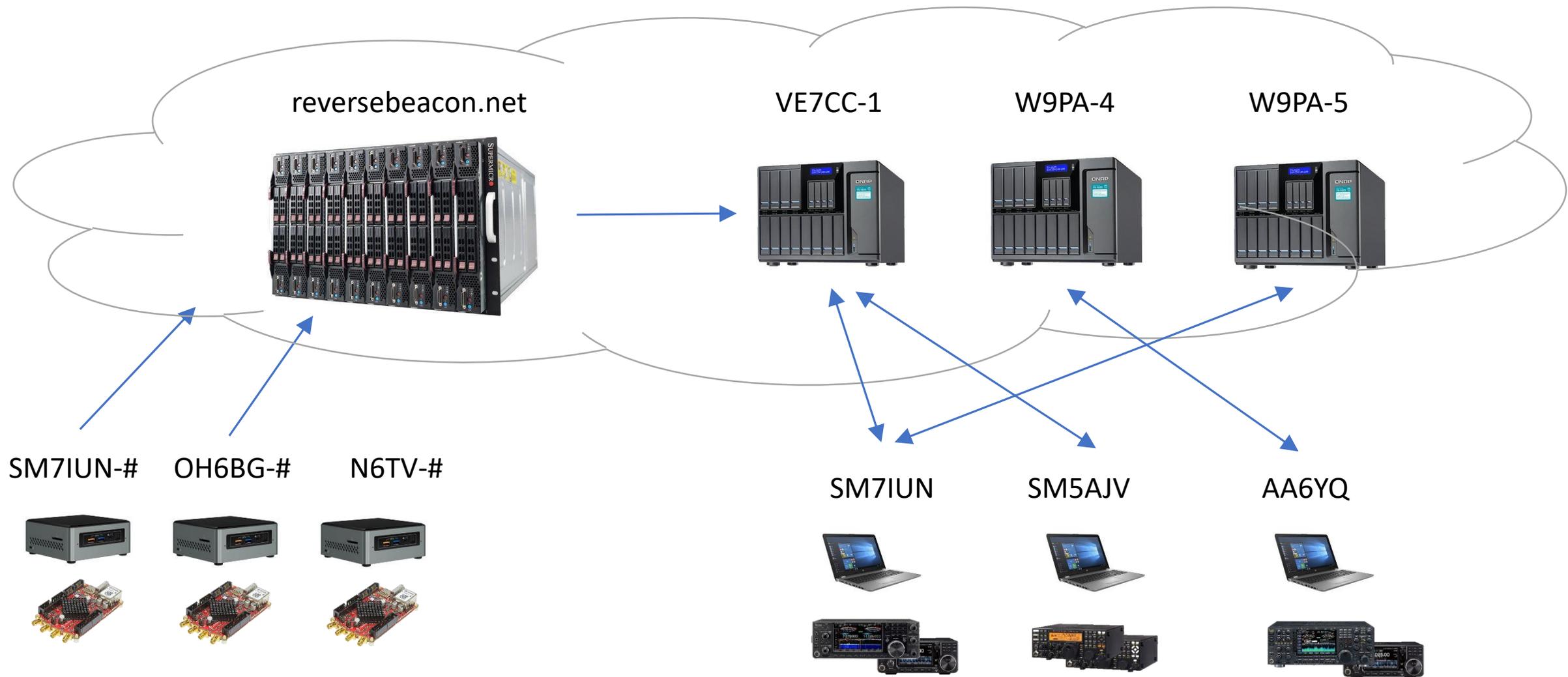
de	dx	freq	cq/dx	snr	speed	time
DL0LBS	LA3ZA	3534.4	CW CQ [LoTW]	19 dB	16 wpm	2031z 22 Apr
DL1EMY	LA3ZA	3534.3	CW CQ [LoTW]	29 dB	15 wpm	2028z 22 Apr
DR1A	LA3ZA	3534.3	CW CQ [LoTW]	23 dB	15 wpm	2028z 22 Apr
LA5EKA	LA3ZA	3534.3	CW CQ [LoTW]	16 dB	15 wpm	2016z 22 Apr
DF7GB	LA3ZA	3534.3	CW CQ [LoTW]	19 dB	15 wpm	2016z 22 Apr

The Reverse Beacon network

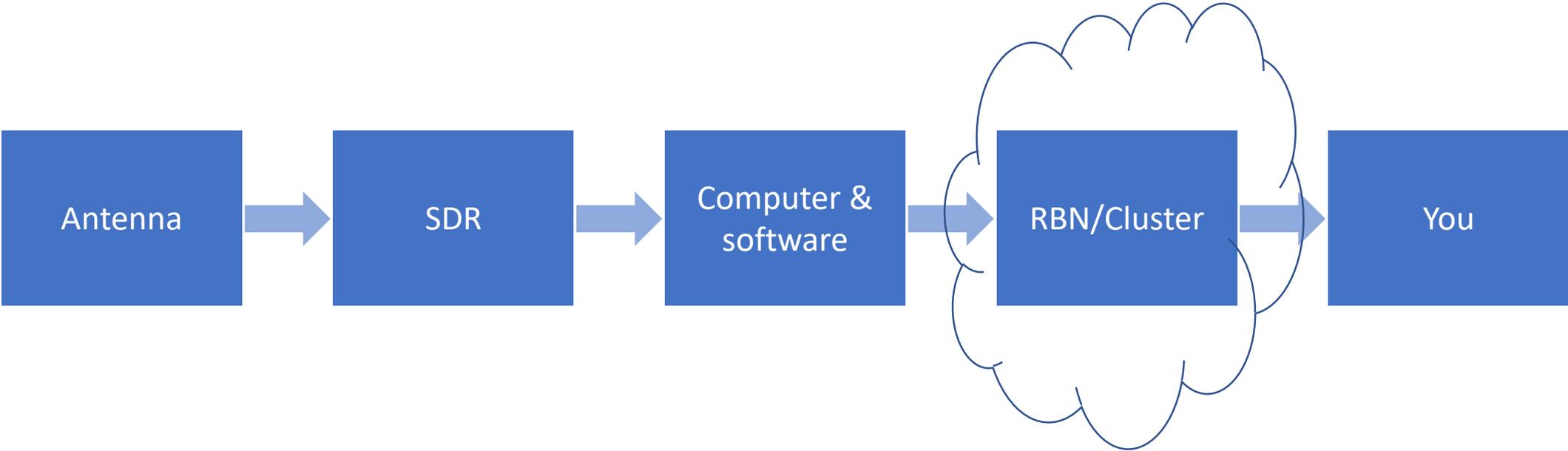
- A global network of skimmer receivers for both Morse code and digital protocols
- ~200 24/7 “skimmers”
- Global coverage
- Highest density in EU & NA



Reverse beacon network & The DX cluster



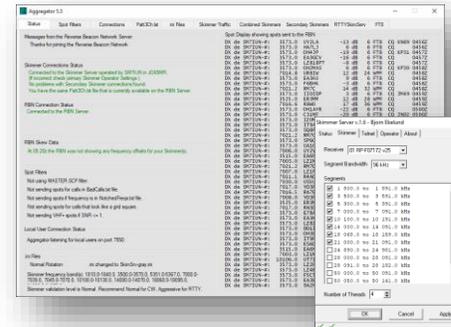
The whole chain



What are the parts in a skimmer?

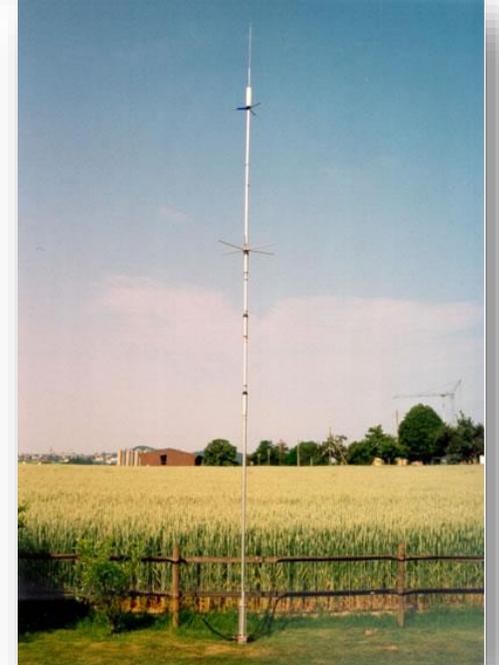
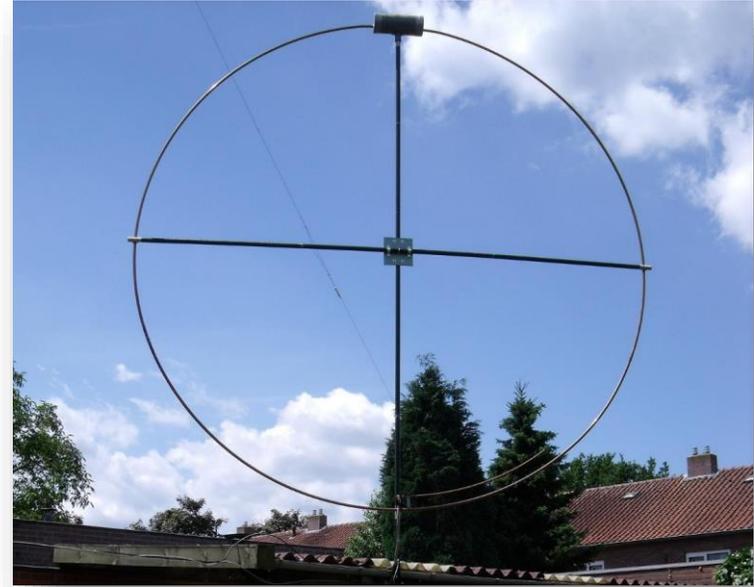


```
for i in people.data.users:
    response = client.api.statuses.user_timeline.get(screen_name=i.scre
    print 'Got', len(response.data), 'tweets from', i.screen_name
    if len(response.data) != 0:
        ltdate = response.data[0]['created_at']
        ltdate2 = datetime.strptime(ltdate, '%a %b %d %H:%M:%S +0000 %Y')
        today = datetime.now()
        howlong = (today-ltdate2).days
        if howlong < daywindow:
            print i.screen_name, 'has tweeted in the past', daywindow,
            totaltweets += len(response.data)
            for j in response.data:
                if j.entities.urls:
                    for k in j.entities.urls:
                        newurl = k['expanded_url']
                        urlset.add(newurl, j.user.screen_name)
    else:
        print i.screen_name, 'has not tweeted in the past', daywind
```



#1 Antenna

- Should be
 - broadband, preferably 1.8-50MHz
 - always connected
 - be immune to local noise or in a low noise environment
- Does not need
 - to work for transmission
 - to be very efficient, SNR is more important than RSSI
 - to be large



#2 Receiver

- Should
 - have a digital quadrature output sampled at 48, 96 or 192kHz
 - be wideband, preferably 1.8-50MHz
 - be support multiple receiver instances
 - preferably be networked (Ethernet)
- Does not need
 - knobs and buttons
 - an audio chain



SDR receivers



Skimmer "site architecture"



Morse code



Radio Teletype



Digital FT8



Windows PC

Skimmer Server v1.6 - Bjorn Daelund

Skimmer Server v1.6 - Bjorn Daelund

Aggregator 5.3

Messages from the Reverse Beacon Network Server

Thanks for joining the Reverse Beacon Network.

Skimmer Connections Status

Connected to the Skimmer Server operated by SMTJUN in JO6SMR
(If incorrect check primary Skimmer Operator Settings.)
No problems with Secondary Skimmer connections found.
You have the same Patt.Sch.list file that is currently available on the RBN Server.

RBN Connection Status

Connected to the RBN Server.

RBN Skew Data

At 14:42z the RBN was not showing any frequency offsets for your Skimmer(s).

Spot Filters

Not using MASTER SCP filter.
Not sending spots for calls in BadCalls.txt file.
Not sending spots if frequency is in NotchedFreqz.txt file.
Not sending spots for calls that look like a grid square.
Not sending VHF+ spots if SNR <= 1.

Local User Connection Status

Aggregator listening for local users on port 7550.

ini Files

Normal Rotation ini changed to SkinSrv-day.ini

Skimmer frequency bands(s): 7000.0-7040.0, 10102.0-10130.0, 14000.0-14070.0, 18068.0-18095.0, 18109.0-18101.0, 21000.0-21070.0, 24890.0-24920.0, 24929.0-

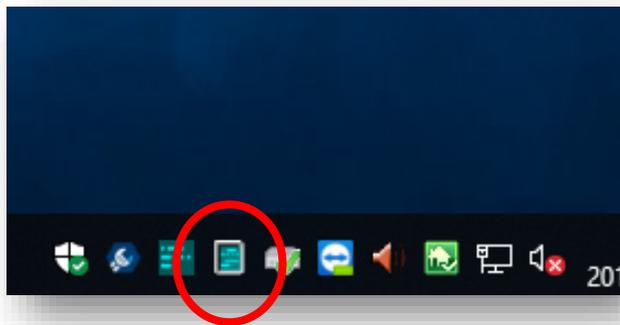
Skimmer validation level is Normal. Recommend Normal for CW. Aggressive for RTTY.

Spot Display showing spots sent to the RBN
DX de SM7IUN-#: 14074.0 RZ3BP -19 dB 6 FT8 CQ 1417Z
DX de SM7IUN-#: 14074.0 ON843 -18 dB 6 FT8 CQ 1417Z
DX de SM7IUN-#: 7019.8 UR5TG 15 dB 24 WPM CQ 1417Z
DX de SM7IUN-#: 14022.2 N8BP 9 dB 27 WPM CQ 1418Z
DX de SM7IUN-#: 14027.0 IT9HTV 23 dB 20 WPM CQ 1418Z
DX de SM7IUN-#: 10119.0 Z33A 20 dB 26 WPM CQ 1418Z
DX de SM7IUN-#: 14046.6 EA6GCA 14 dB 11 WPM CQ 1419Z
DX de SM7IUN-#: 10109.0 OV1CDX 9 dB 21 WPM CQ 1419Z
DX de SM7IUN-#: 14025.0 R6F5 30 dB 25 WPM CQ 1419Z
DX de SM7IUN-#: 14018.9 SM7RYR 44 dB 29 WPM CQ 1420Z
DX de SM7IUN-#: 7018.6 DL1REH 17 dB 27 WPM CQ 1420Z
DX de SM7IUN-#: 7032.0 US7WA 36 dB 21 WPM CQ 1420Z
DX de SM7IUN-#: 10119.0 F/FR5DZ 8 dB 20 WPM CQ 1422Z
DX de SM7IUN-#: 7005.0 I83UL5 11 dB 15 WPM CQ 1422Z
DX de SM7IUN-#: 7021.3 RU3ZL 25 dB 25 WPM CQ 1430Z
DX de SM7IUN-#: 14026.0 RWFF 27 dB 26 WPM CQ 1430Z
DX de SM7IUN-#: 7016.8 UR5LGI 12 dB 33 WPM CQ 1431Z
DX de SM7IUN-#: 10109.0 OV1CDX 13 dB 22 WPM CQ 1432Z
DX de SM7IUN-#: 10112.5 VO4W 8 dB 18 WPM CQ 1432Z
DX de SM7IUN-#: 7028.8 ON7ZH 24 dB 19 WPM CQ 1433Z
DX de SM7IUN-#: 7020.2 HB9DWP 10 dB 29 WPM CQ 1433Z
DX de SM7IUN-#: 7015.5 FG1JU 15 dB 19 WPM CQ 1433Z
DX de SM7IUN-#: 7019.5 G4LNA 23 dB 23 WPM CQ 1433Z
DX de SM7IUN-#: 10106.5 LZ7YJ 16 dB 24 WPM CQ 1433Z
DX de SM7IUN-#: 7018.6 DL1REH 17 dB 30 WPM CQ 1434Z
DX de SM7IUN-#: 10119.0 F/FR5DZ 14 dB 20 WPM CQ 1434Z
DX de SM7IUN-#: 14022.7 EA6NB 31 dB 22 WPM CQ 1434Z
DX de SM7IUN-#: 10116.0 IZ4FUF 6 dB 17 WPM CQ 1435Z
DX de SM7IUN-#: 7014.6 UN7LDR 6 dB 23 WPM CQ 1435Z
DX de SM7IUN-#: 7017.0 RNSAA 10 dB 28 WPM CQ 1436Z
DX de SM7IUN-#: 14005.0 LZ1JP 21 dB 23 WPM CQ 1436Z
DX de SM7IUN-#: 7025.0 RW3PG 10 dB 29 WPM CQ 1437Z
DX de SM7IUN-#: 7015.8 OJ3TT 30 dB 33 WPM CQ 1437Z
DX de SM7IUN-#: 7012.3 LZ1LN 6 dB 23 WPM CQ 1437Z
DX de SM7IUN-#: 7012.0 XW3DT 8 dB 24 WPM CQ 1438Z
DX de SM7IUN-#: 7013.0 ON8ALG 34 dB 23 WPM CQ 1439Z
DX de SM7IUN-#: 7017.0 HB9JDI 21 dB 25 WPM CQ 1439Z
DX de SM7IUN-#: 7014.0 UA3FO 22 dB 33 WPM CQ 1440Z
DX de SM7IUN-#: 7032.5 OE6SGD 13 dB 14 WPM CQ 1440Z
DX de SM7IUN-#: 10105.5 OZ6CH 10 dB 28 WPM CQ 1440Z
DX de SM7IUN-#: 7030.0 G4RDM 10 dB 28 WPM CQ 1440Z
DX de SM7IUN-#: 14023.0 IU0JFZ 16 dB 19 WPM CQ 1440Z
DX de SM7IUN-#: 10114.3 HA6AU 33 dB 23 WPM CQ 1441Z
DX de SM7IUN-#: 10117.0 IZ4FUF 19 dB 16 WPM CQ 1441Z
DX de SM7IUN-#: 7024.3 PA3DGH 23 dB 25 WPM CQ 1442Z
DX de SM7IUN-#: 7008.2 UR4X6N 18 dB 22 WPM CQ 1442Z
DX de SM7IUN-#: 7005.0 OE6SGD 10 dB 14 WPM CQ 1442Z
DX de SM7IUN-#: 7017.4 HA6AU 24 dB 22 WPM CQ 1443Z
DX de SM7IUN-#: 7033.0 DB2SDNN 24 dB 17 WPM CQ 1443Z
DX de SM7IUN-#: 14037.1 H53NBR 18 dB 26 WPM CQ 1443Z
DX de SM7IUN-#: 14031.0 P34/IK1HJ5 12 dB 36 WPM CQ 1443Z
DX de SM7IUN-#: 7005.0 OE6SPL 10 dB 14 WPM CQ 1444Z

CW Skimmer Server

An “embedded” CW Skimmer with Telnet interface for RBN Aggregator or a DX cluster node

8 × 91kHz segments shortwave bands = 10-15% CPU load on 2GHz Core i5



<http://www.dxatlas.com/SkimServer>

A screenshot of the Skimmer Server v.1.6 - Bjorn Ekelund application window. The window has a title bar with the name and a close button. Below the title bar is a menu bar with 'Status', 'Skimmer', 'Telnet', 'Operator', and 'About'. The main area is divided into sections: 'Telnet Server' with a green checkmark and 'Telnet Server OK'; 'SDR Receiver' with a green checkmark and 'SDR Receiver OK'; and 'Activity' which contains a table. Below the table are several input fields for 'Decoders', 'Spots in 30 min.', 'Telnet Users', 'Number of CPU's', 'CPU Load', and 'Signals Decoded'. At the bottom are 'OK', 'Cancel', and 'Apply' buttons. Two green checkmarks are visible at the very bottom of the window.

Segment	Decoders
3 500.0 kHz	111
5 350.0 kHz	0
7 000.0 kHz	160
10 102.0 kHz	25
14 000.0 kHz	67
18 068.0 kHz	1
21 000.0 kHz	4
24 890.0 kHz	0

Decoders: 368 Number of CPU's: 4
Spots in 30 min.: 421 CPU Load: 14.4%
Telnet Users: 1 Signals Decoded: 100.0%

CW Skimmer Server

Simple Telnet feed with frequency, call sign, SNR, transmission speed and time

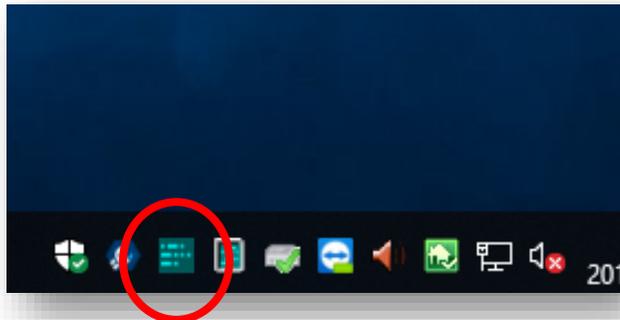
```
DX de SM7IUN-#: 3563.6 DL8WR 25 dB 19 WPM CQ 1828Z
DX de SM7IUN-#: 3526.0 OZ1JHM 28 dB 35 WPM CQ 1828Z
DX de SM7IUN-#: 3556.0 F6DZS 13 dB 23 WPM CQ 1829Z
DX de SM7IUN-#: 3563.0 DO3ASE 23 dB 23 WPM CQ 1829Z
DX de SM7IUN-#: 7023.5 II0IDP 6 dB 30 WPM CQ 1829Z
DX de SM7IUN-#: 3568.0 DL5EE 11 dB 22 WPM CQ 1829Z
DX de SM7IUN-#: 7030.4 EA3GMH 6 dB 20 WPM CQ 1829Z
DX de SM7IUN-#: 7008.6 UA3WF 17 dB 25 WPM CQ 1829Z
DX de SM7IUN-#: 7029.0 IK1LJG 16 dB 18 WPM CQ 1829Z
DX de SM7IUN-#: 3565.0 DK3DUA 25 dB 17 WPM CQ 1830Z
DX de SM7IUN-#: 7036.0 LZ1VKD 15 dB 21 WPM CQ 1830Z
DX de SM7IUN-#: 7022.5 UD4C 12 dB 25 WPM CQ 1831Z
DX de SM7IUN-#: 7004.0 R4CGI 9 dB 15 WPM CQ 1831Z
DX de SM7IUN-#: 10116.0 IT9HTV 17 dB 22 WPM CQ 1832Z
DX de SM7IUN-#: 1835.0 G4VSQ 3 dB 15 WPM CQ 1832Z
DX de SM7IUN-#: 3532.0 II1IGG 17 dB 26 WPM CQ 1832Z
DX de SM7IUN-#: 7015.0 YU125VS 24 dB 19 WPM CQ 1832Z
DX de SM7IUN-#: 10105.4 EA3AVQ 15 dB 25 WPM CQ 1832Z
DX de SM7IUN-#: 3557.7 IK2UWA 25 dB 24 WPM CQ 1833Z
DX de SM7IUN-#: 7020.0 UR5LQT 15 dB 16 WPM CQ 1833Z
DX de SM7IUN-#: 1815.9 DK3DUA 16 dB 16 WPM CQ 1833Z
DX de SM7IUN-#: 7035.0 UD4C 13 dB 28 WPM CQ 1833Z
DX de SM7IUN-#: 5352.0 HA2PP 21 dB 23 WPM CQ 1833Z
```

- Typically CW Skimmer Server does not report party stations, only “CQ-ers”
- Spotting keywords:
CQ QRZ TEST NA SS FD UP
- Short call signs (e.g. SE5E) should be repeated for secure spotting
- Remember that spotting is not guaranteed even if propagation is sufficient, e.g. due to interference

RBN Aggregator

Curates and aggregates spots before uploading to RBN cloud. Negligible CPU load on host.

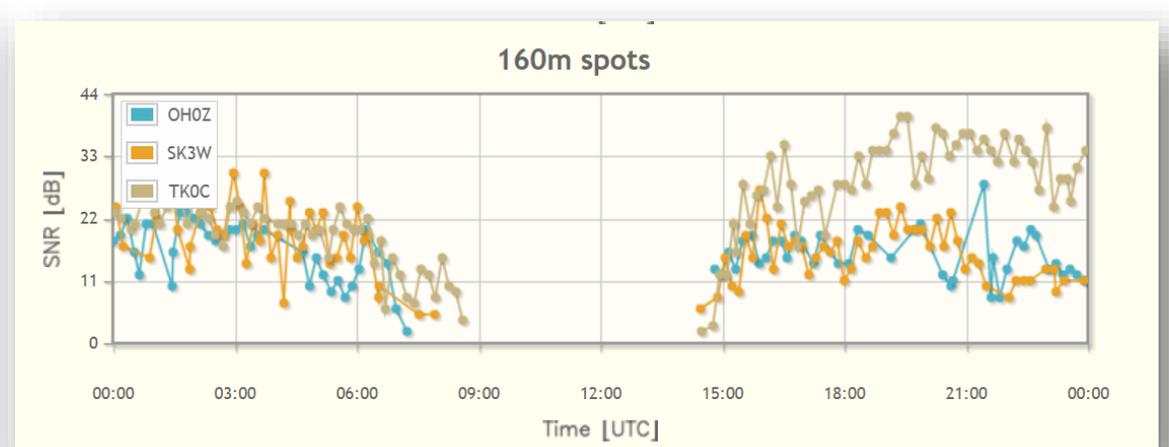
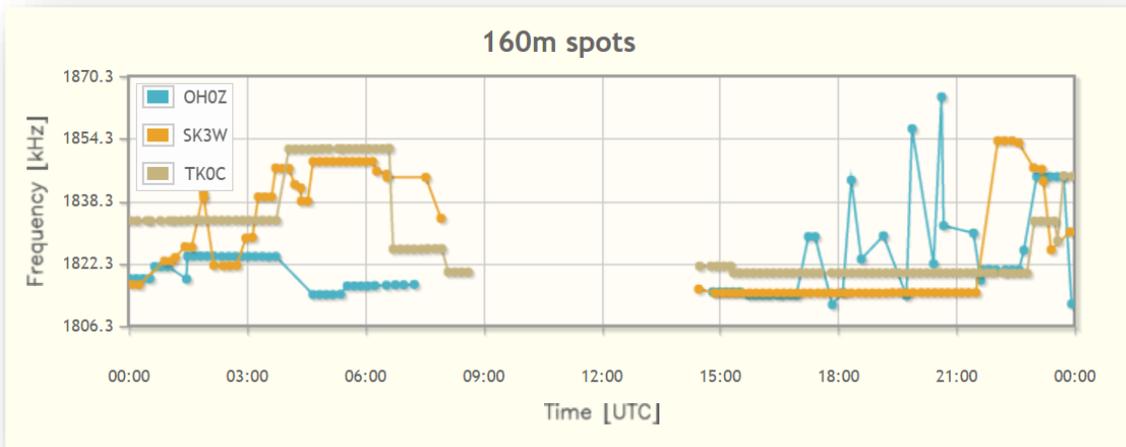
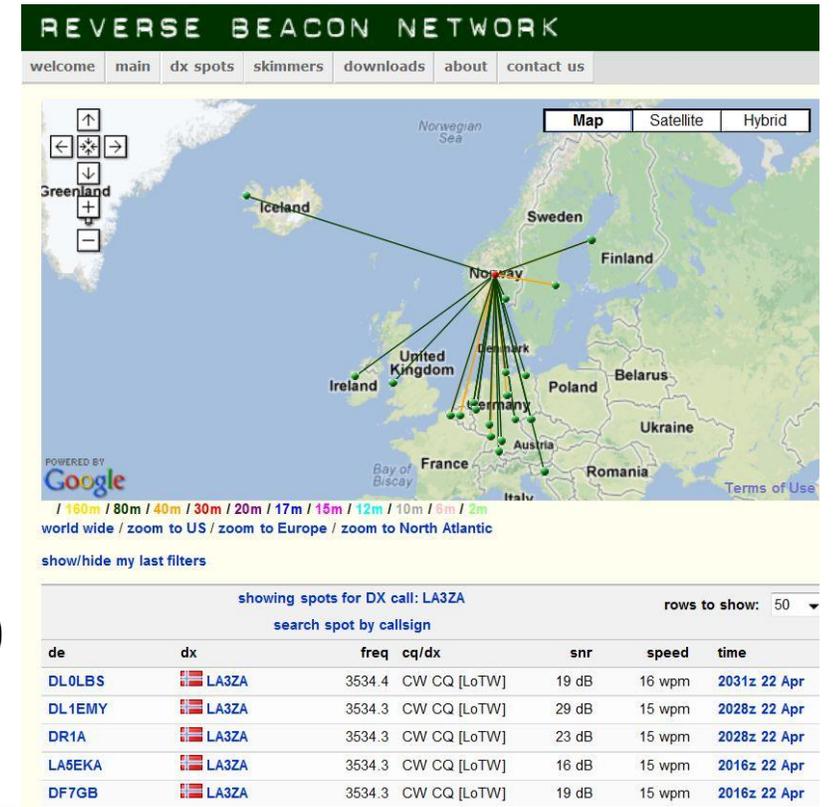
Telnet client for CW and RTTY skimmers. UDP broadcast listener for FT8 skimmers.



A screenshot of the RBN Aggregator 5.4b1 software interface. The window title is 'Aggregator 5.4b1'. The interface is divided into several sections. On the left, there are tabs for 'Status', 'Spot Filters', 'Connections', 'Patt3Ch.lst', 'ini Files', 'Skimmer Traffic', 'Combined Skimmers', 'Secondary Skimmers', 'RTTYSkimServ', and 'FT8'. The 'Status' tab is active, showing messages from the Reverse Beacon Network Server, Skimmer Connections Status (connected to SM7IUN in JO65MR), RBN Connection Status (connected to the RBN Server), RBN Skew Data (no frequency offsets at 16:29z), Spot Filters (not using MASTER.SCP filter, etc.), Local User Connection Status (listening on port 7550), and ini Files (Normal Rotation, Skimmer frequency bands, etc.). On the right, there is a 'Spot Display' showing a list of spots sent to the RBN. Each spot is represented by a line of text containing call sign, frequency, power, and other parameters. The list includes spots from various call signs like F6IJ, RK3Q/7, HB90BQR, etc., with frequencies ranging from 7013.0 to 7026.2 MHz and power levels from 21 dB to 36 dB. The spots are sorted by frequency and power.

The Reverse Beacon network

- A cloud service
- “A shortwave communications data lake”
 - All data available for download
- 300,000,000+ data points collected since 2009
- Extensive suite of online analysis tools

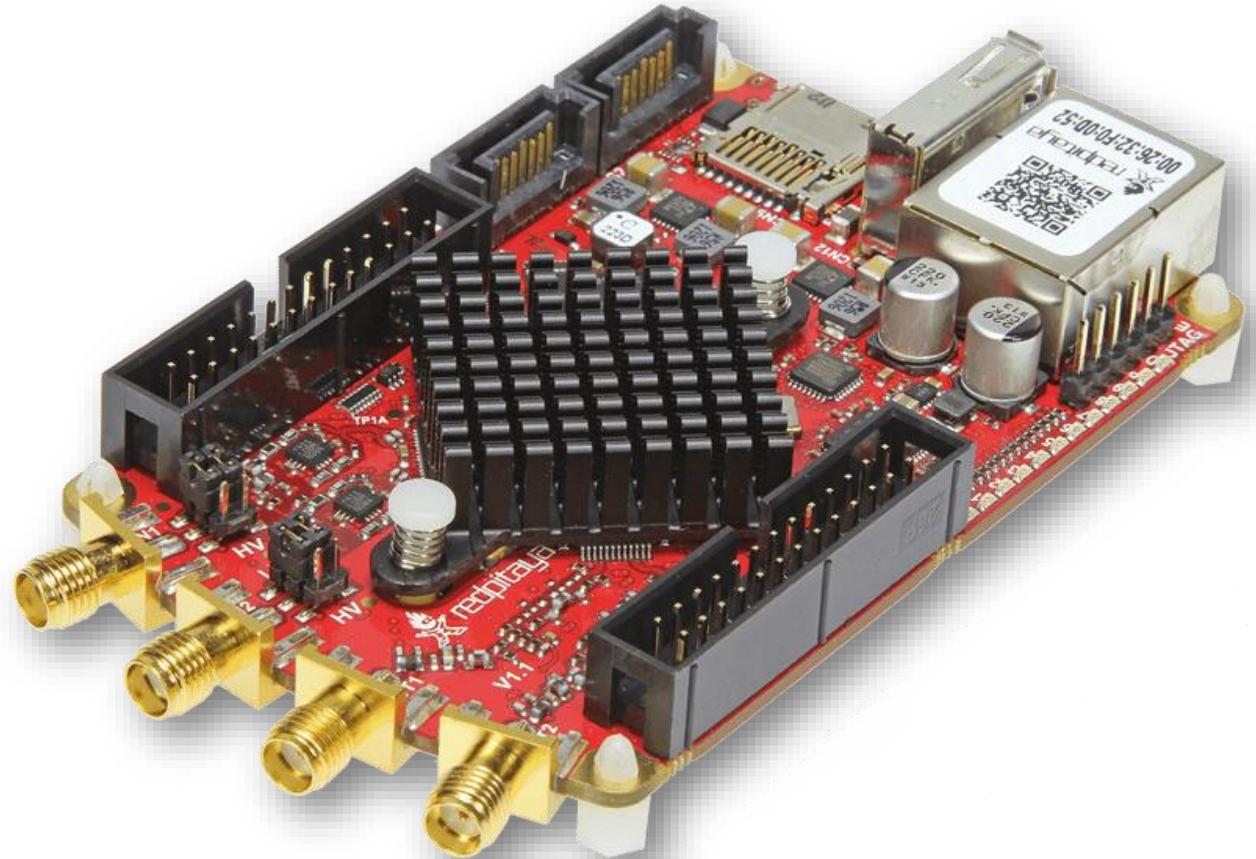


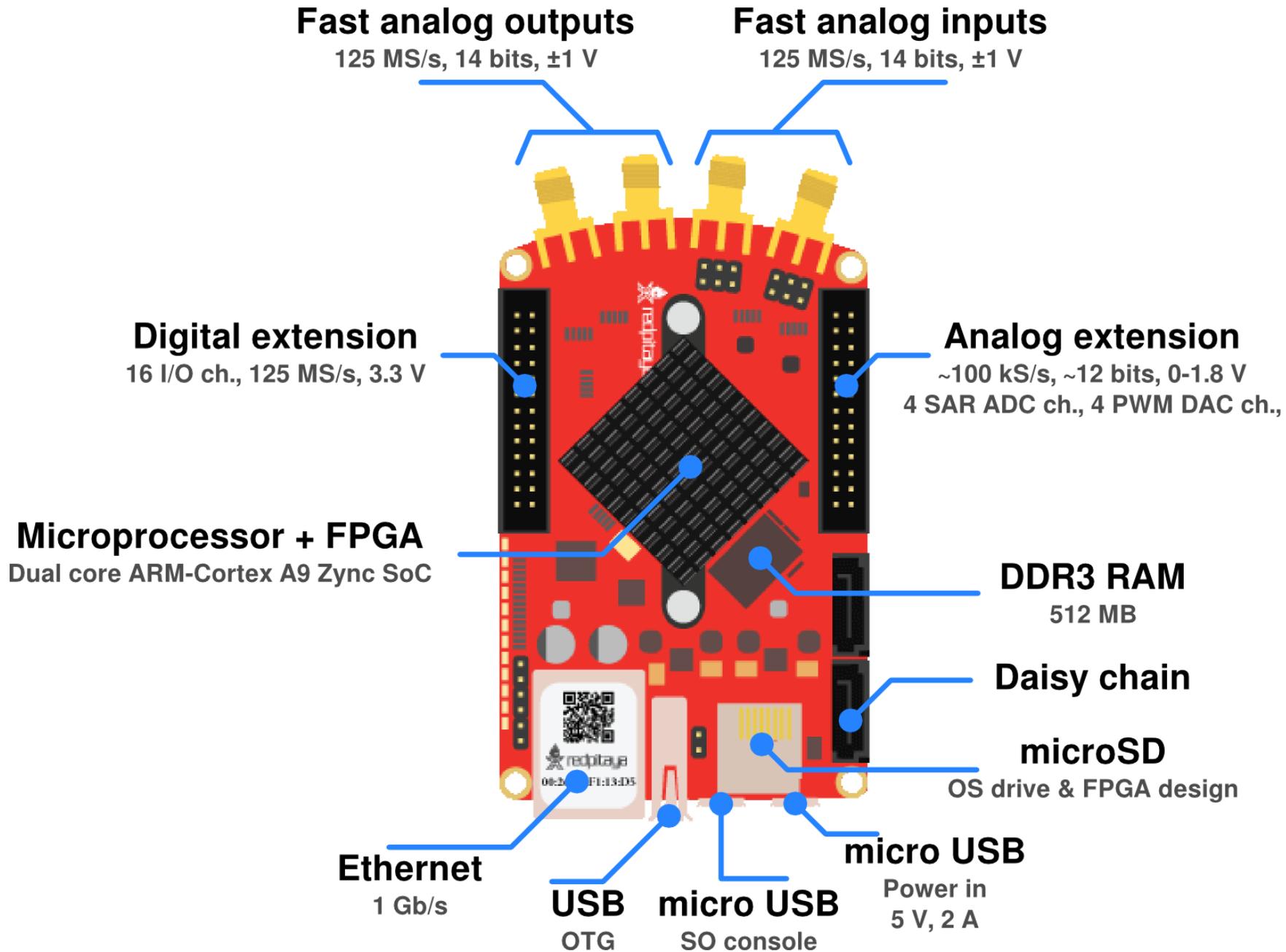


“The Raspberry Pi of DSP”

Red Pitaya 125-14

- Based on Xilinx Zynq 7010
 - 28,000 logical cells FPGA
 - 80 programmable DSP slices
 - 100 GMAC/s performance
 - 667MHz Cortex A9 MPcore with Neon and CoreSight
 - Two 125MHz 14 bit ADC/DAC
 - Four 100kHz ADC/DAC
 - 16 GPIO
-
- Started as a Kickstarter project
 - Over 30,000 sold
 - Base ports for Ubuntu and Alpine Linux
 - Free Xilinx Vivado tool suite

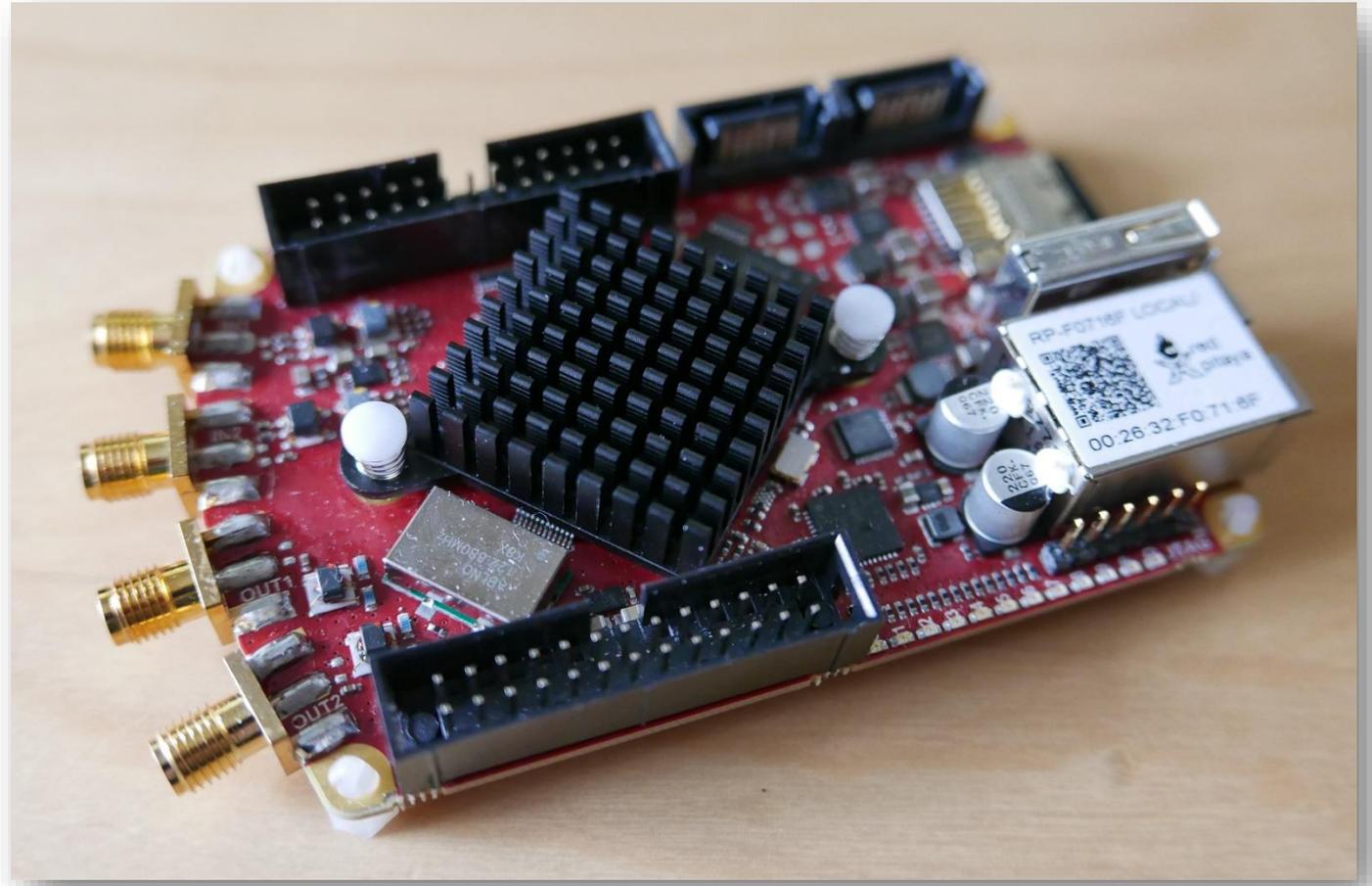




“The Raspberry Pi of DSP”

Red Pitaya 122.88-16

- Based on Xilinx Zynq 7020
- 85,000 logical cells FPGA
- 220 programmable DSP slices
- 276 GMAC/s performance
- 667MHz Cortex A9 MPcore with Neon and CoreSight
- Two 122.88MHz 16 bit ADC
- Two 122.88MHz 14 bit DAC
- Four 100kHz ADC/DAC
- 16 GPIO
- ABLNO XO <50fs jitter





Oscilloscope &
Signal
Generator



Logic analyser



STEMlab SDR
transceiver



Bode Analyser



LCR meter



DFT Spectrum
Analyser



SDR receiver
compatible
with HPSDR



Vector
Network
Analyser



Red Pitaya
Store



Application
marketplace



Feedback



Python
programming



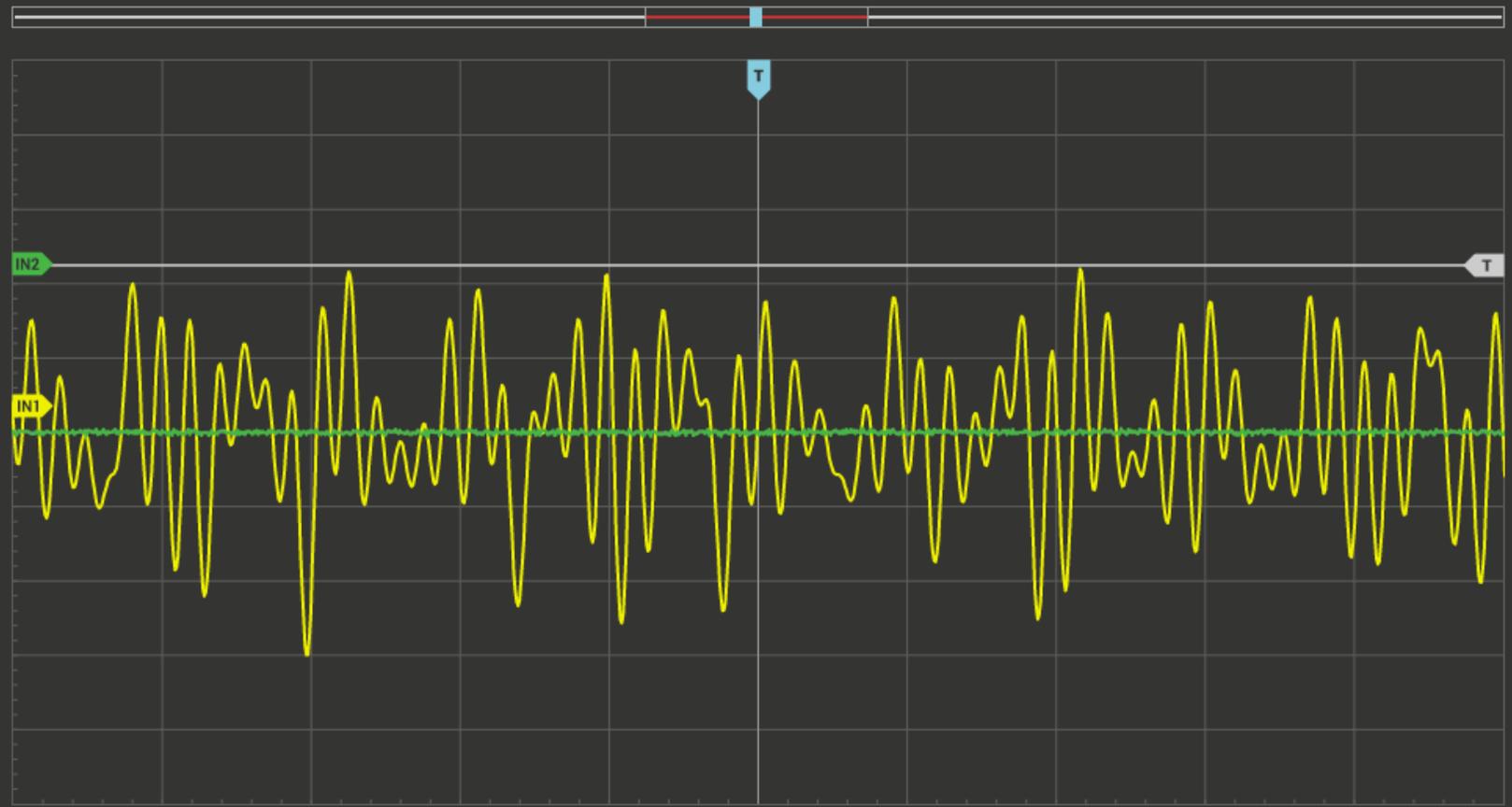
System



Development

17.19kB/s

<
redpitaya
SETTINGS
EXPORT
AUTO SCALE
STOP



IN1	⚙️
IN2	⚙️
OUT1	⚙️
OUT2	⚙️
MATH	⚙️
TRIG	⚙️
CURSOR	MEAS

IN1 50 mV/div
IN2 10 mV/div

AUTO

Time 2 ms/div
Trig ↑ IN2 0 V
0 ms
122.070kS/s



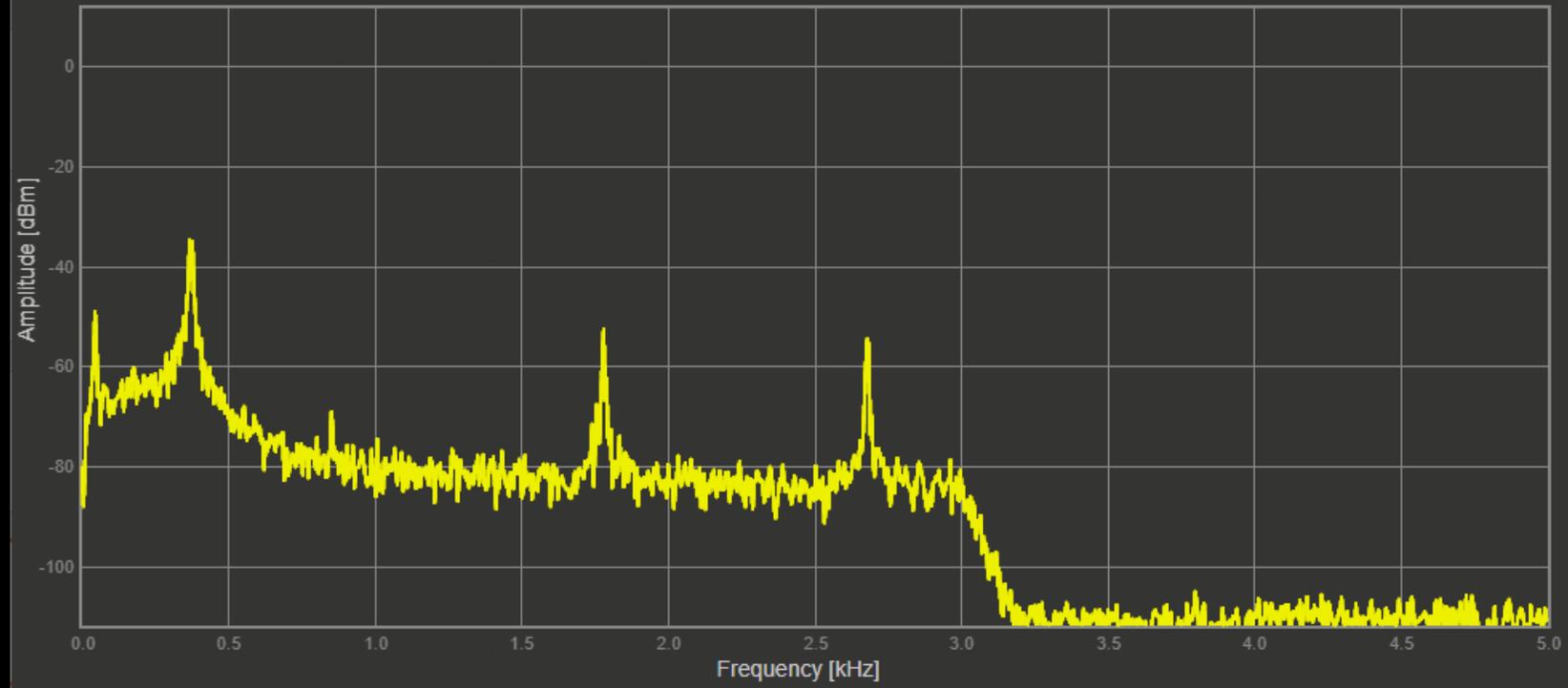
28.91kB/s



EXPORT

CLEAR

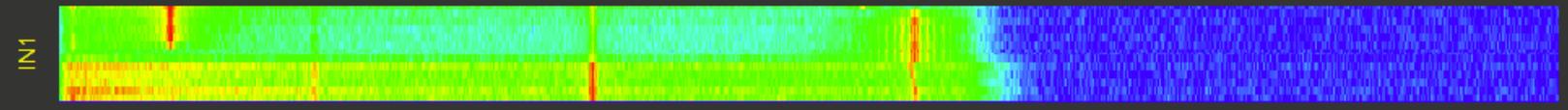
STOP



< Range	Freq. unit: kHz
Start freq. 0	End freq. 5

Peak Ch1:
-34,685 dBm @ 0,37 kHz

Peak Ch2:
OVER RANGE



Setup Memory Wave Equalizer XVTRs CWX Diversity Collapse Linearity RA

POWER RX2

MON TUN
MOX ALEX
DUP PS-A
REC PLAY

Master AF: 29

RX1 AF: 0

RX2 AF: 4

AGC Gain: 120

Drive: 100

AGC ATT

Med 0dB

SQL: -160

2019-10-15

LOC 20:46:52

CPU% 51

VFO A

7,012 044
40M CW TX

VFO Sync
VFO Lock

10,120000

Tune Step: - 25Hz +

Save Restore

VFO B

50,049 925
TX 6M Beacon Sub-Band



Pan: Center Zoom: 0.5x 1x 2x 4x

SPLT A > B
0 Beat A < B
IF->V A <> B
RIT 0 XIT 0

NR ANF
NB SNB
MUT BIN
MNF

Panafall
AVG Peak
CTUN

Speed: 30 WPM
lambic
Sidetone

APF
Tune: 0
Bandwidth: 150
RX1 Gain: 3

Vol Pan Vol
Sync
VAC1 VAC2

MultiRX
Swap

Show TX CW Frequency
Show CW Zero Line
Pitch Freq (Hz): 600

CW Break In
Semi Break-In Delay (ms) 300

RX1 Meter TX Meter
Signal Fwd Pwr
-126 dBm
1 3 5 7 9 +20 +40 +60

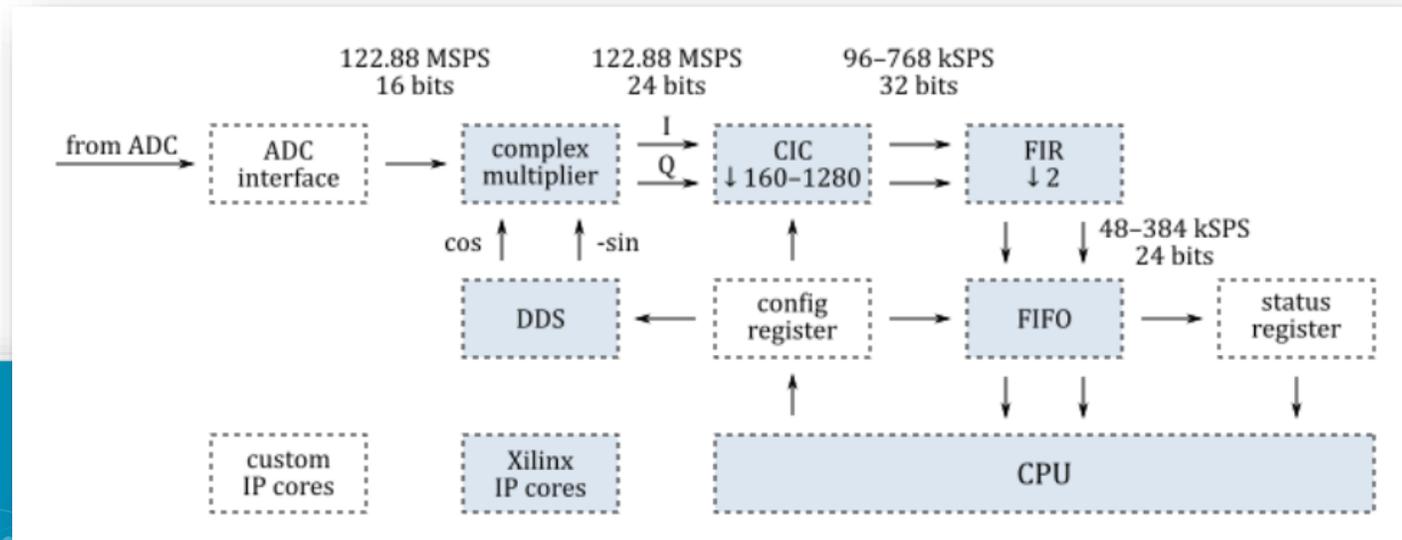
160 80 60
40 30 20
17 15 12
10 6 LFMF
VHF+ WWV GEN

LSB USB DSB
CWL CWU FM
AM SAM SPEC
DIGL DIGU DRM

1.0k 800 750
600 500 400
250 100 50
25 Var 1 Var 2

Width:
Shift: Reset
Low 481 High 731

Pavel Demin @ KU Leuven



1. List of components
2. Links
3. Development machine
4. LED blinker
5. SDR receiver
6. SDR transceiver
7. SDR transceiver compatible with HPSDR
8. SDR receiver compatible with HPSDR
9. Embedded SDR transceiver
10. Wideband SDR transceiver
11. Multiband WSPR transceiver
12. Multiband FT8 transceiver
13. Pulsed Nuclear Magnetic Resonance
14. Multichannel Pulse Height Analyzer
15. Scanning system
16. Vector Network Analyzer
17. Alpine with pre-built applications



Pavel Demin • 1st

IT Engineer at Université catholique de Louvain

Brussels Area, Belgium

Message

More...

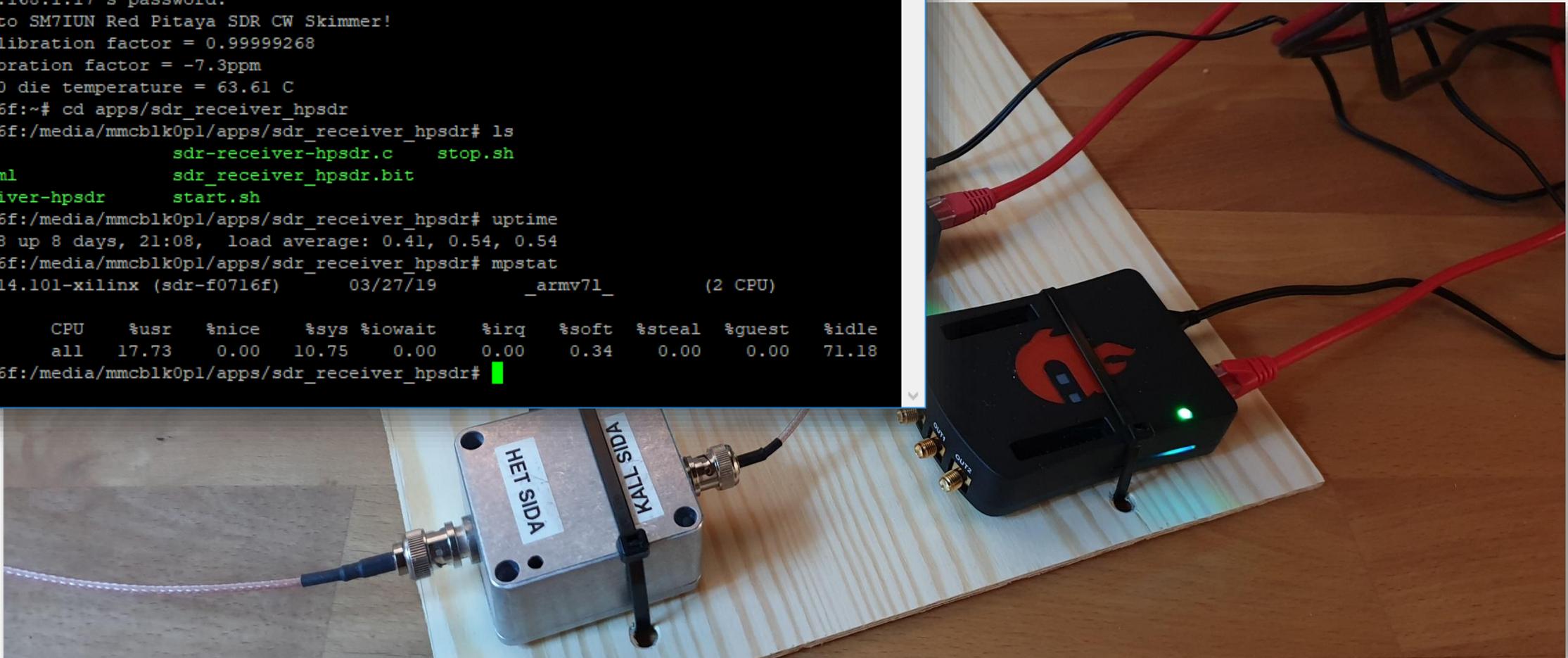
- Université catholique de Louvain
- Université Joseph Fourier - Grenoble 1
- See contact info
- See connections (94)

<http://pavel-demin.github.io/red-pitaya-notes/>

CW and FT8 skimmers @ SM7IUN

```
192.168.1.17 - PuTTY
login as: root
root@192.168.1.17's password:
Welcome to SM7IUN Red Pitaya SDR CW Skimmer!
HPSDR calibration factor = 0.99999268
FT8 calibration factor = -7.3ppm
Zynq 7020 die temperature = 63.61 C
sdr-f0716f:~# cd apps/sdr_receiver_hpsdr
sdr-f0716f:/media/mmcblk0pl/apps/sdr_receiver_hpsdr# ls
Makefile          sdr-receiver-hpsdr.c  stop.sh
index.html        sdr_receiver_hpsdr.bit
sdr-receiver-hpsdr  start.sh
sdr-f0716f:/media/mmcblk0pl/apps/sdr_receiver_hpsdr# uptime
 12:20:18 up 8 days, 21:08,  load average: 0.41, 0.54, 0.54
sdr-f0716f:/media/mmcblk0pl/apps/sdr_receiver_hpsdr# mpstat
Linux 4.14.101-xilinx (sdr-f0716f)      03/27/19      _armv7l_      (2 CPU)

12:20:19  CPU    %usr   %nice    %sys %iowait    %irq   %soft  %steal  %guest   %idle
12:20:19  all    17.73   0.00   10.75   0.00   0.00   0.34   0.00   0.00   71.18
sdr-f0716f:/media/mmcblk0pl/apps/sdr_receiver_hpsdr#
```



Cloud-to-cloud: HA8TKS

Band: **20 m** Use the slider to set the frequency range: 14000 kHz - 14105 kHz

Skimmer: AF AS EU OC NA SA DXCall: AF AS EU OC NA SA

Map center callsign: SM7IUN Map Callsign

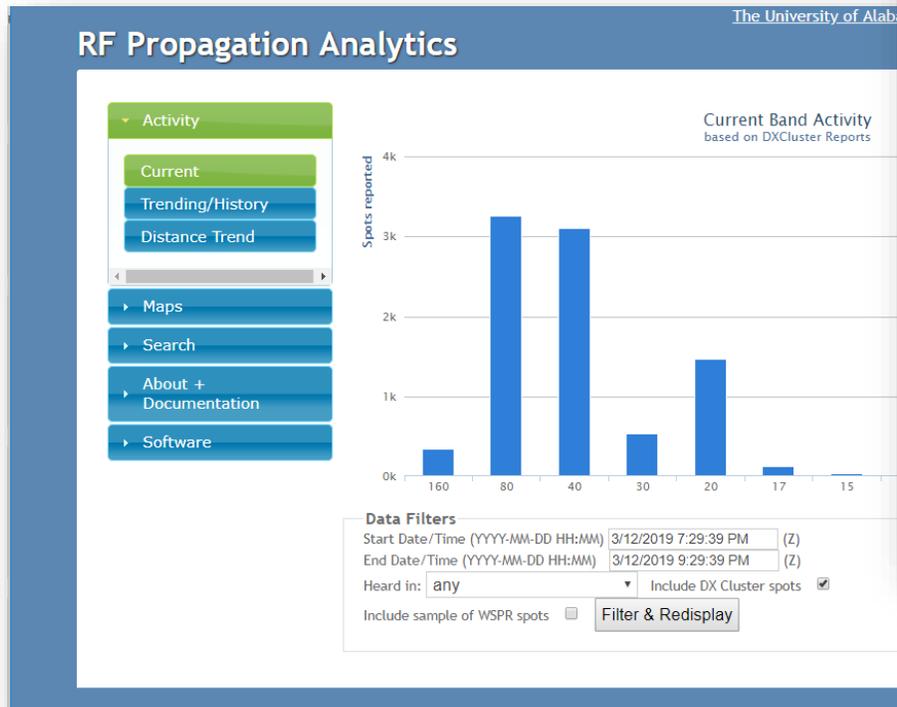
Radius: 20000 km

Time	Call Sign	Frequency	Mode	Power	Direction
21:10	JA75FD	7019.0	RT6C	CW	21:12
21:10	E070UWC	7011.0	CS7AMH	CW	21:12
21:10	WA2VUY	7133.1	W32DX	SSB	21:11
21:09	OY1R	7022.0	W3LPL	CW	21:11
21:08	7P8LB	7092.0	HA0SWL	SSB	21:11
21:08	E070UWC	7011.0	UY2UQ	CW	21:11
21:08	7P8LB	7092.0	EA7JXZ	SSB	21:10
21:07	OE1SSU	7075.0	EA7JMO	FT8	21:10
21:07	S01WS	7018.0	LZSPW	CW	21:09
21:07	E070UWC	7010.0	DF4IY	CW	21:06
21:06	H50ZMY	7160.0	IU0DZA	SSB	21:06
21:06	A92HK/M	7121.0	SP8ALT	SSB	21:05
21:05	7P8LB	7092.0	IZ0GVZ	SSB	21:05
21:05	UT9EU	7140.0	IU4LEC	SSB	21:03
21:04	II11GG	7032.0	R3ET	CW	21:03
21:04	G6MND	7076.0	EA7JMO	FT8	21:02
21:03	KS5ZS	7278.0	N0RZ	SSB	21:02
21:02	S56B	7074.0	9A6CC	FT8	21:02
21:01	RT6DE	7153.0	HL2WA	SSB	21:01
21:00	H50ZMY	7160.0	RT6C	SSB	21:01
20:59	EA1TF	7075.2	EA7JMO	FT8	21:00
20:58	7P8LB	7097.0	RU9GC	SSB	21:00
20:57	UT9EU	7140.0	UR8BS	SSB	20:59
20:56	G3RCW	7075.8	EA7JMO	FT8	20:58
20:55	9K2BS	7185.0	SP8ENR	SSB	20:55
20:54	IU0LFQ	7074.0	7Z1AQ	FT8	20:55
20:54	J14JKO	7074.0	7Z1AQ	FT8	20:54
20:53	DK1RU	7133.0	CS7AMH	SSB	20:52
20:52	AE4GS	7195.0	W5FKM	SSB	20:52
20:52	CT9/DL3KWF	7006.0	W1WC	CW	20:51
20:52	PJ7TH	7013.7	W3LPL	CW	20:51
20:51	RT6DE	7153.0	EW4GBC	SSB	20:49
20:51	9K2BS	7185.0	HL2WA	SSB	20:49
20:51	9K2BS	7185.0	SV9QWP	SSB	20:48
20:51	RA3VLZ	7074.0	9A6CC	FT8	20:47
20:50	S56B	7074.0	7Z1AQ	FT8	20:47

Development: HA8TKS, THX for the idea Z55L

<https://dxcluster.ha8tk.s.hu>

Cloud-to-cloud: University of Alabama



Cloud-to-cloud: DX maps

The image shows two overlapping screenshots of the DXMAPS 4.0 website. The top screenshot displays a world map with a grid of call signs and numerous black lines representing QSO/SWL connections between various locations. The bottom screenshot shows the same website interface but with a detailed list of real-time information for the time 18:57z.

WWW.DXMAPS.COM 18:57z WWW info: SFI=70 A=12 K=2-Unsettled SWX=Minor storm

Time	Call Sign	Mode	Distance	Notes
2019-03-17 18:57	IK2QEB (JN55LD)	14.218.0 SSB	577EI (JJ06)	4399 km
2019-03-17 18:54	I7OEB (JM99AX)	14.218.0 SSB	XR0ZRC (FF06)	12851 km
2019-03-17 18:54	F8JUV (JN18BW)	14.074.0 FT8	6W7/ON4AVT (IK14MI)	4220 km FT8
2019-03-17 18:50	IV3RJT (JN65SW)	14.215.0 SSB	9G2DX (IJ95)	4705 km LoTW trn 4 qso 73 s
2019-03-17 18:50	D19IU (JO50KG)	14.074.4 FT8	CE2FME (FF47)	12189 km trn FT8 qso
2019-03-17 18:50	F8BNU (JO10K)	14.032.0 CW	5X3C (KJ61HW)	6066 km trn for qso.73 up
2019-03-17 18:49	TA5FA (KN90UX)	14.248.0 SSB	5X3C (KJ61HW)	4397 km
2019-03-17 18:46	E15GSB (IO51WU)	14.218.0 SSB	577EI (JJ06)	5109 km Thanks Lads La Fheile Pdraig
2019-03-17 18:44	K0DMW (EN35)	14.097.1 WSPR	F1AGR (JN04RJ)	LoTW 6955 km EN35<->JN04RJ WSPR SNR=-29
2019-03-17 18:44	OZ7IT (JO65DF)	14.097.1 WSPR	V53ARC (JG87)	LoTW 8649 km JO65DF<->JG87 WSPR SNR=-22
2019-03-17 18:44	G4CUI (IO93FI)	14.097.2 WSPR	F1AGR (JN04RJ)	LoTW 1019 km IO93FI<->JN04RJ WSPR SNR=-25
2019-03-17 18:44	IZ0FKE (JN61FW)	14.097.2 WSPR	G0CCL (JO02BF)	LoTW 1472 km JN61FW<->JO02BF WSPR SNR=-11
2019-03-17 18:44	OZ7IT (JO65DF)	14.097.1 WSPR	G0CCL (JO02BF)	LoTW 865 km JO65DF<->JO02BF WSPR SNR=-23
2019-03-17 18:44	EA2AAE (IN82KU)	14.097.1 WSPR	G0CCL (JO02BF)	LoTW 1069 km IN82KU<->JO02BF WSPR SNR=-24
2019-03-17 18:42	TA5FA (KN90UX)	14.248.0 SSB	5X3C (KJ61HW)	4397 km up5
2019-03-17 18:42	TR0TTEL (JJ40RL)	14.218.0 SSB	OE3JC (JN88HH)	5361 km
2019-03-17 18:41	DL7JAN (JN49IF)	14.248.0 SSB	5X3C (KJ61HW)	5727 km up5
2019-03-17 18:40	IW9GYL (JM77MN)	14.022.0 CW	E51DOM/MM (JF97)	7796 km up 0.8 great ears!! Enjol 3Y0I
2019-03-17 18:36	EA7JZZ (IM87EC)	14.215.0 SSB	9G2DX (IJ95)	LoTW 3521 km trn QSO, 5/7 in Spain, 73
2019-03-17 18:36	IK2WSO (JN45OL)	14.218.0 SSB	577EI (JJ06)	4401 km 5 to 10 up
2019-03-17 18:36	IV3OKO (JN66IB)	14.215.0 SSB	9G2DX (IJ95)	LoTW 4694 km
2019-03-17 18:35	IK2YDJ (JN55)	14.218.0 SSB	XR0ZRC (FF06)	12580 km trn for qso
2019-03-17 18:34	VK3KHZ (QF22PE)	14.097.1 WSPR	HB9TJM (JN36FQ)	16524 km QF22PE<->JN36FQ WSPR SNR=-25
2019-03-17 18:34	DL/PA0EHG (JO32SQ)	14.097.1 WSPR	EA7ADI (IM77AI)	2000 km JO32SQ<->IM77AI WSPR SNR=-20
2019-03-17 18:34	OZ7IT (JO65DF)	14.097.1 WSPR	G0CCL (JO02BF)	LoTW 865 km JO65DF<->JO02BF WSPR SNR=-20
2019-03-17 18:34	EA8BFK (IL38BO)	14.097.2 WSPR	F1AGR (JN04RJ)	LoTW 2218 km IL38BO<->JN04RJ WSPR SNR=-22
2019-03-17 18:34	EA8BFK (IL38BO)	14.097.1 WSPR	M0AEZ (JO01DE)	LoTW 2774 km IL38BO<->JO01DE WSPR SNR=-20
2019-03-17 18:34	SM4VEY (JO59WK)	14.097.0 WSPR	EA7ADI (IM77AI)	LoTW 2765 km JO59WK<->IM77AI WSPR SNR=-11
2019-03-17 18:34	DP0GVN (B59VI)	14.097.1 WSPR	G0CCL (JO02BF)	LoTW 13675 km B59UH<->JO02BF WSPR SNR=-26
2019-03-17 18:34	TF1VHF (HP84WL)	14.097.0 WSPR	EA7ADI (IM77AI)	LoTW 3199 km HP84WL<->IM77AI WSPR SNR=-22
2019-03-17 18:34	OZ7IT (JO65DF)	14.097.0 WSPR	EA7ADI (IM77AI)	LoTW 2415 km JO65DF<->IM77AI WSPR SNR=-2
2019-03-17 18:34	EA8BFK (IL38BO)	14.097.1 WSPR	G0CCL (JO02BF)	LoTW 2869 km IL38BO<->JO02BF WSPR SNR=-3
2019-03-17 18:34	EA8BFK (IL38BO)	14.097.1 WSPR	PD1RA (JO22XF)	LoTW 3094 km IL38BO<->JO22XF WSPR SNR=-21
2019-03-17 18:34	DK8FTJA (JN58OE)	14.097.1 WSPR	HZ1SK (KL91)	LoTW 3860 km JN58OE<->KL91 WSPR SNR=-24
2019-03-17 18:33	IK4ZGX (JN54KV)	14.022.0 CW	E51DOM/MM (JF97)	LoTW 8640 km trn
2019-03-17 18:33	5V7XRO (JO60F)	14.218.0 SSB	IK8BQE (JN70EN)	LoTW 4035 km a great dser..
2019-03-17 18:32	IK4SE (JN54PL)	14.218.0 SSB	577EI (JJ06)	4335 km mondo pescatori...
2019-03-17 18:31	OE3IDE (JN78XK)	14.218.0 SSB	577EI (JJ06)	4867 km NOT XR0ZRC
2019-03-17 18:31	IT8ZZ (JM68QD)	14.223.0 SSB	IK8BQE (JN70EN)	LoTW 282 km e ascolta.poi scrivi.
2019-03-17 18:31	F4WBL (JN25)	14.218.0 SSB	XR0ZRC (FF06)	12163 km
2019-03-17 18:30	IK8ROF (JN70EN)	14.218.0 SSB	XR0ZRC (FF06)	12594 km

<https://www.dxmaps.com>

Cloud-to-cloud: VOACAP

VOACAP Quick Guide

HF Propagation Prediction and Ionospheric Communications Analysis

by Jari Perkiömäki, OH6BG/OG6G

What is VOACAP?

VOACAP (Voice of America Coverage Analysis Program) is free professional high-frequency (HF) propagation prediction software from NTIA/ITS, originally developed for Voice of America (VOA).

This 'work-in-progress' guide should get you well started with the software. A more comprehensive discussion about the finer details of using the software can be found in George Lane's book [Signal-to-Noise Predictions Using VOACAP: A User's Guide](#). The book is now available on CD-ROM.

There is now also ["The Official VOACAP Blog"](#) - well, it's not too official.

NOTE: Running automated scripts to access VOACAP services is strictly prohibited unless agreed upon in advance.

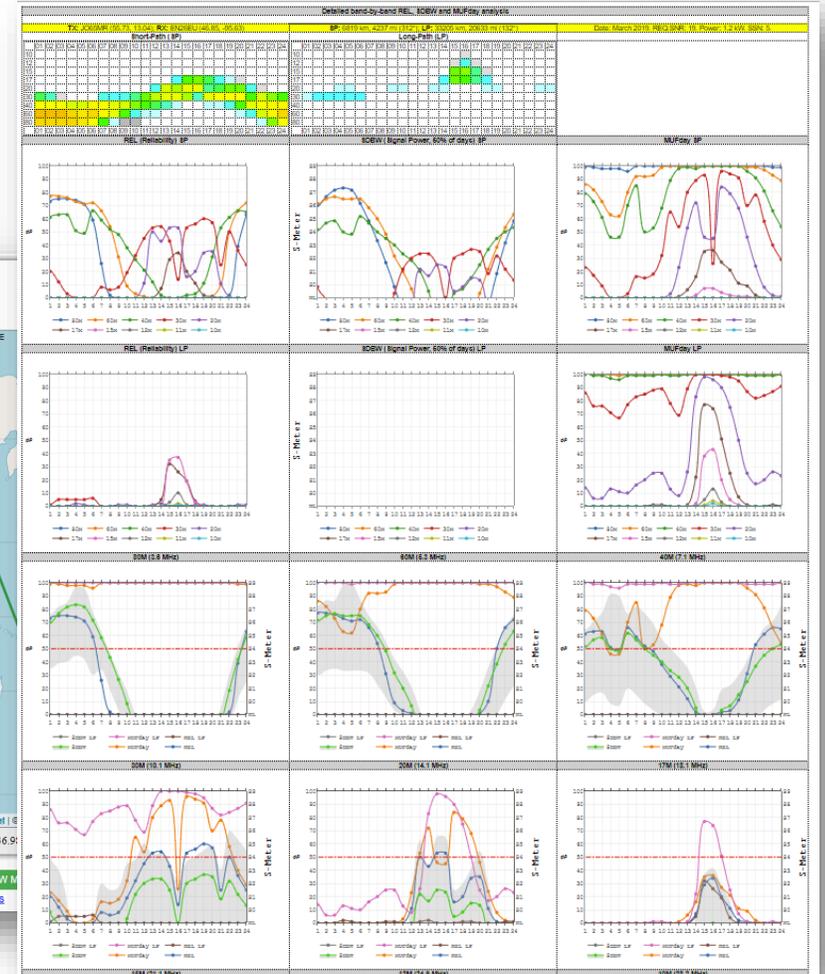
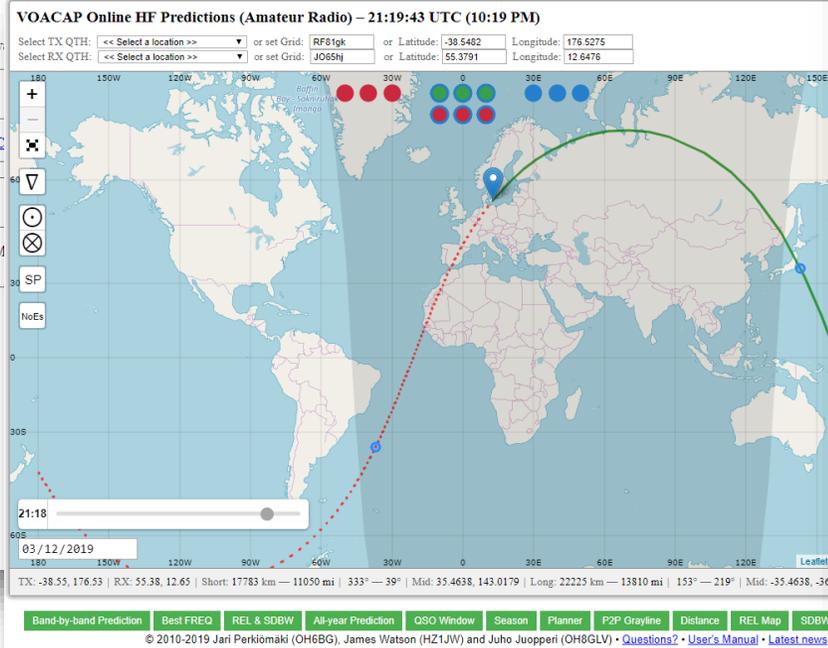
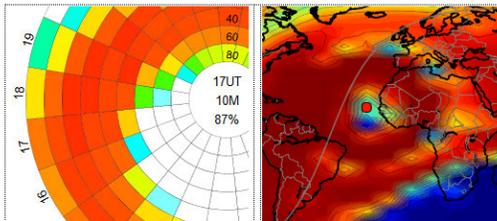
FOLLOW ME ON TWITTER FOR THE LATEST NEWS

If you wish to keep abreast of the latest developments on the site, follow me on Twitter at: twitter.com/VOACAP

VOACAP PREDICTIONS FOR MARITIME HF

Using Maritime HF SSB transceivers? I have now launched a VOACAP HF propagation prediction site for Maritime HF: <http://voacap.com/marine> - work's in progress still. Comments & suggestions welcome.

VOACAP Online Prediction Services



Client software: SpotCollector

Part of the larger DXLab radio station management suite.

Integration with propagation prediction tools, call sign data base, station logbook, awards rule base, etc.

SpotCollector 8.3.0 @ 2019-03-12 21:52 Z [CC,DXK,PF,DXV,PV] 6 entries (log: SM7IUN.mdb)

WWV 03-12 2106 Z
SFI 71 History
Q: 6 A 9 1 K

Outgoing spot
Call CT1ILT 1 840,0 Freq Cluster
Notes X Local

Spot source status
Report Stats Prop Config Help

	Freq	Call	DXCCCountry	Mode	LastTime	Notes	Source	Network	LastOr	NA	SA	EU	AF	AS	Odx	State	Need	SPS	SPPro
	1 820.6	3B8XF	Mauritius Islan	CW	2019-03-12 2144	QSX 1822.25	DL1ROJ	EI7MRE	EU			Y			359		DZ		
	1 824.6	JA5DQH	Japan	CW	2019-03-12 2142	CW 18 dB 22 WPM CQ	JF2IWL-#	VE7CC	AS			Y		Y	1270		DZ		
	1 840.0	7P8LB	Lesotho	FT8	2019-03-12 2141	FT8 normal	EU0EU-@	CQDX	EU			Y	Y		897		DZ		
	7 092.0	7P8LB	Lesotho	SSB	2019-03-12 2142	only Ja	IV3RJT	CQDX	EU			Y			630		D	3	
	10 110.0	XR0ZRC	Juan Fernandi	CW	2019-03-12 2145	QSX 10111.88 IOTA SAC	EA4ZK	EI7MRE	EU		Y	Y		Y	936		DZ	-8	3
	14 012.0	XR0ZRC	Juan Fernandi	CW	2019-03-12 2149	still 569 here	DM5EM	EI7MRE	EU	Y	Y	Y			538		D	7	38

Sort: First Call Last Freq Rcv Az

Filter: SQL [Need F]
ce2sv X AutoHide Need Call DXCC Freq Tag Band Mode Cont Origin
Audio Age LoTW eQSL Mrthn S C
Need F Need C N+ EU CWops Unkwn Need S My spot Myneed

Color codes
■ verified ■ unneeded ■ unconfmrd ■ unwrkd B or M ■ unwrkd counter ■ special tag

What use is the RBN for me?

Contesting



- Band openings
- Band-map filler
- Spots you
- Find clear spots
- Strategizing
- Benchmarking competition

DX-ing



- Band openings
- Alerts for rare stations
- Propagation reports

Antenna experiments



- Antenna directivity
- Radiation angle
- A-B testing

2018 Jeep Compass

SAND
SNOW
RIVERS
ROCKS

