

WebSDR

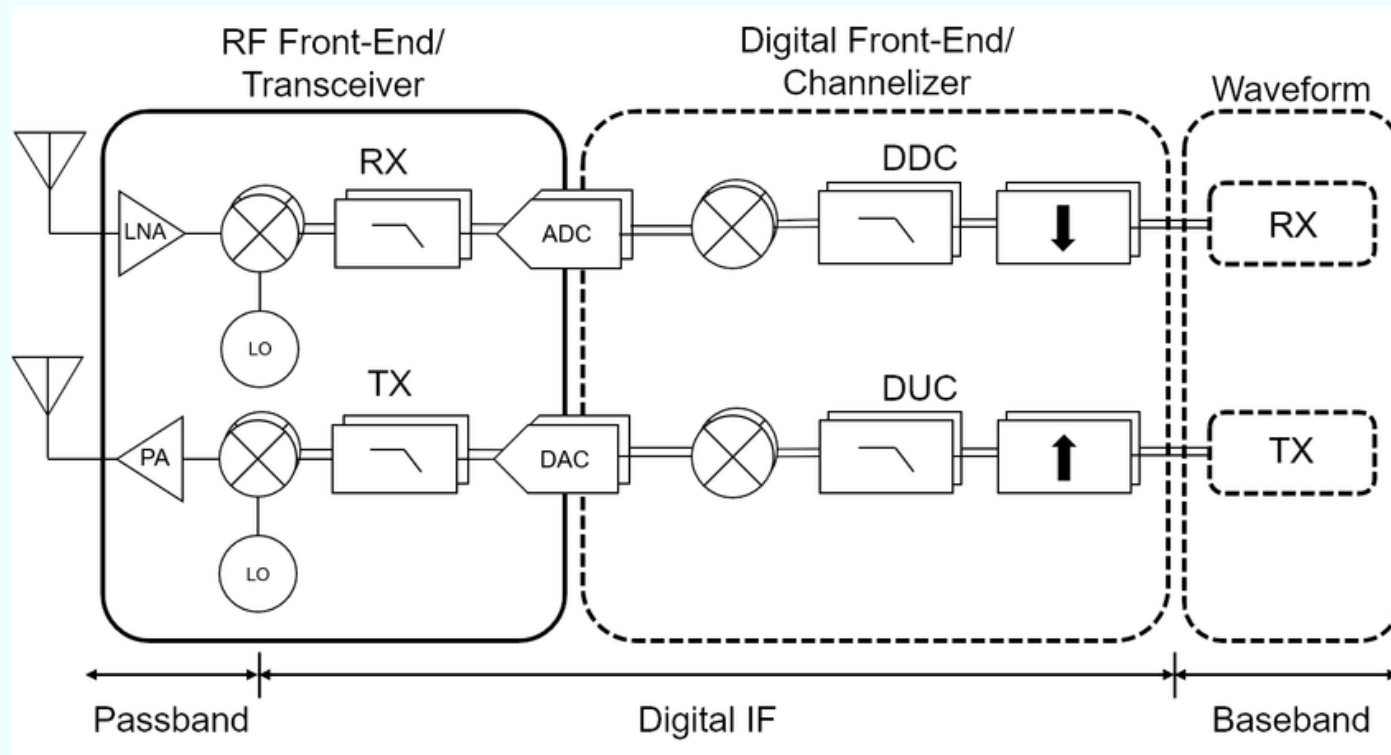
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FVARC Presentation February 18, 2025

Topics

- Overview of Software Defined Radio (SDR)
- What is WebSDR?
- Architecture of a WebSDR station
- What does WebSDR offer to the user?
- Who can use it?
- Using WebSDR as your secondary receiver
- Adding a WebSDR station of your own to the network
 - WEB-888 SDR Receiver

Typical Direct Conversion SDR Architecture



Xmr uqkji&arflwr & k&f&~umf&inwjhy&nts{jw&ts&w&sy&jsi&g&fx&ji&XIW&fwhm&y&hy&zw&j&k&fyz&w&ji&ss&a fs~&x~xyjr x3
Ymj&WK&w&sy&jsi&nts{jw&x&n&ls&f&g&jy| jjs&uf&xx&g&fsi&f&si&g&fx&j&g&fsi&3&uy&ts&f&g&f&n&ls&f&g&f&w&in&ly&f&g&a n&j&i&t&%
fsi&w&tr &f&s&sy&jw jirfy&j&w&jv&z&jsh~&z&x&sl&f&in&ly&f&g&w&sy&jsi&t&w&hm&f&ss&j&q&j&w&fi&in&ts&f&g&j&w&sl&f&si&x&fr uqj&
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Advantages of Direct Conversion SDR

- Simpler design with far fewer components = lower cost and enhanced reliability
 - Smaller size
- Reduced power consumption
- Elimination of image frequency issues (no IF stages)
 - This is especially beneficial in crowded spectrum environments
- High selectivity
 - All the top receivers in Sherwood Engineering's test of Dynamic Range, Narrow-Spaced (2 kHz), are SDR transceivers
- Flexible digital signal processing enabling a wide range of receiver functions

WebSDR Background

- First conceived as a way to make the 25 m radiotelescope at Dwingeloo, NL available to many radio amateurs for EME reception
- First implementation of WebSDR was done by the amateur radio club at the University of Twente, NL in 2007
- Beta testing of a public release of the software began in 2008
- Software is now freely available
- WebSDR servers are available to cover spectrum from 9 kHz to 2 GHz and beyond



WebSDR Server Implementations

- SDR technology has made it easy and affordable to put wideband SDR receivers on the Web for others to use
 - All the users need is a Web browser
 - The user can adjust the frequency, passband and mode
- These Web-accessible SDR receivers can be single-user at a time or support multiple users simultaneously
- Web SDR servers can consist of a PC running Linux, a radio interface and an SDR radio or be self-contained units
 - PC-based servers often employ a quadrature mixer connected to the PC's soundcard, such as the popular SoftRock kits or RTL-SDR dongle
 - SDRplay RSP1, RSP1a and RSP1b are also popular SDR receivers



Self-contained WebSDR Servers

- Raspberry Pi builds
 - Needs an SDR HF “hat”
 - Pi 3s can support about 1 MHz of bandwidth at a time
 - Pi 4s can support about 2 MHz of bandwidth at a time
- Web-888 SDR Receiver (<https://www.rx-888.com/web/>)
 - Actually, runs an open clone of WebSDR called OpenWebRX
 - Web user interface is virtually identical
 - Source code is modified from Beagle_SDR_GPS
 - <https://github.com/RaspSDR/server>

Web-888 SDR Receiver

- Based on the proven RX-888
 - 16-bit ADC for good dynamic range
 - Covers 1 kHz to 62 MHz, and 118 MHz to 145 MHz
 - Listen to the airband
 - Simultaneously operate 13 RX channels and 13 waterfall channels
- Compatible user experience with KiwiSDR
 - Runs OpenWebRX
- Single board design, combining FPGA and CPU
 - Low power consumption
 - Efficient form factor
 - Supports precision reference clock
- Accessible from virtually any web browser
- Minimal setup – put your own WebSDR server on the Internet
 - Share idle antennas or dedicate antennas



What Does WebSDR Offer to the User?

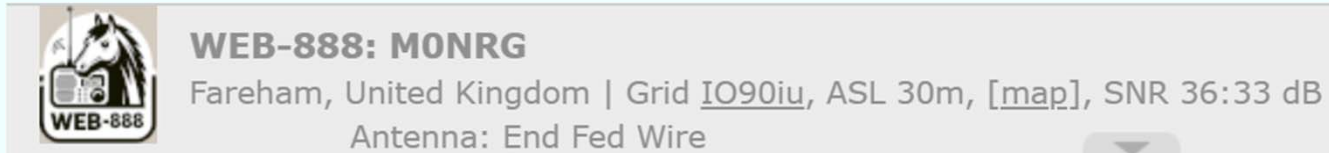
- No license required to use WebSDR receivers
 - Potential hams can experience worldwide HF radio without a shack
- Enjoy worldwide radio that would be cost-prohibitive or impossible to achieve with your own local radio and antenna setup
 - Compensate for too high a noise floor at your QTH
- Listen to yourself as heard by others
- Listen to EU broadcast stations as they complain about Trump
- Follow emergencies/disasters in other countries
- Listen to shortwave radio from around the world, with signal quality that might be impossible to achieve from your own station
- Use a WebSDR server as a secondary receiver
- Use WebSDR stations with antenna farms that most of us can only dream of

What Does WebSDR Offer to the User? (cont.)

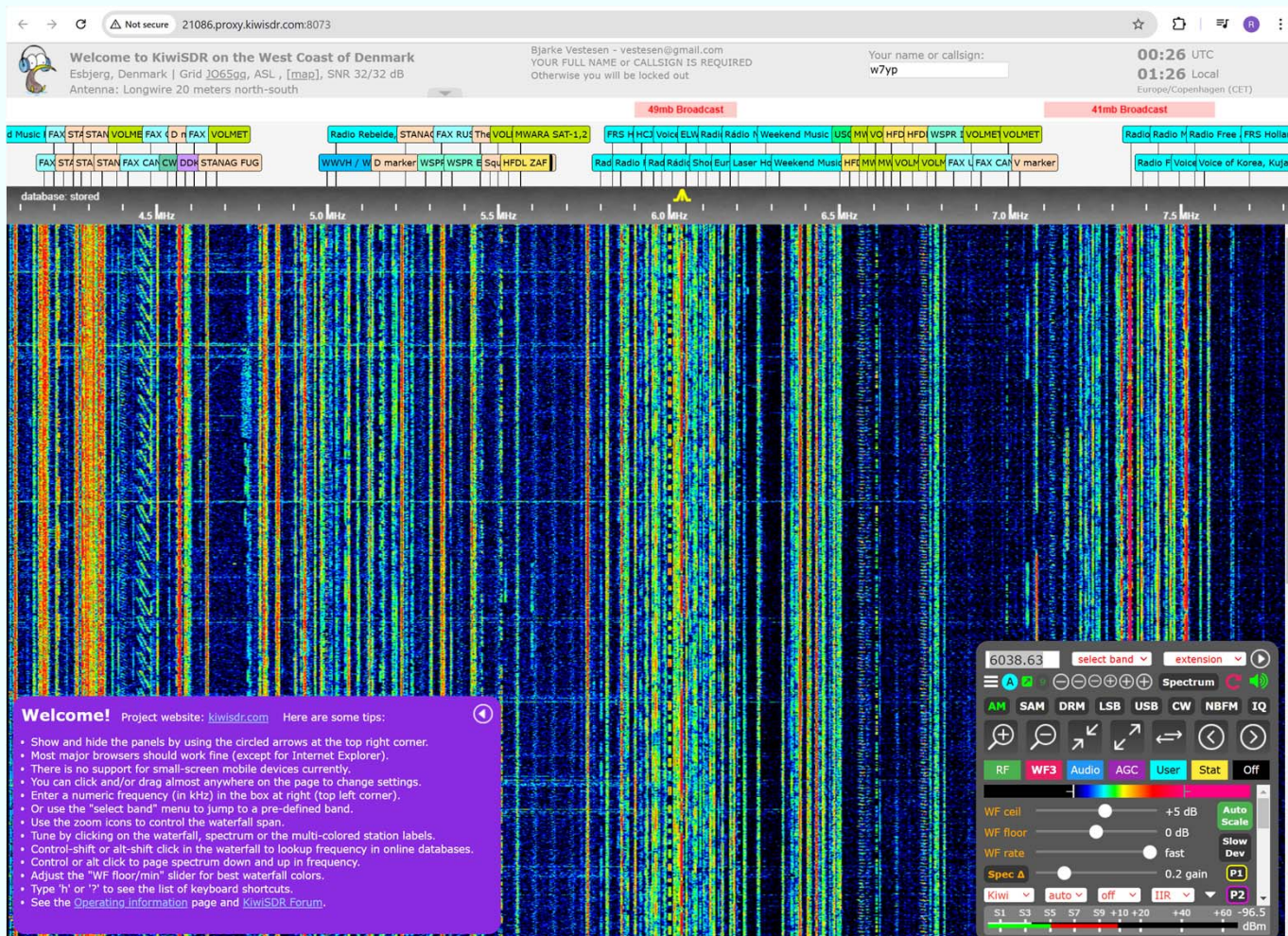
- Decodes an amazing number of modulation types and digital modes
 - Analog modulation: AM, SAM, FM, NFM, WFM, SSB, CW
 - Digital modulation: ASK, FSK, PSK, RTTY, SSTV, Digital FM, HF FAX, DRM, Packet, FT8/FT4, JS8Call, WSPR, DMR, D-Star, YSF, NXDN, M17, FreeDV...
 - Aeronautical comms: Voice, ADS-B, HFDL, VDL2, ACARS
 - Maritime comms: AIS, MSI, NAVTEX, DSC
 - And more, with more being added
- All decoding is done in the server
- Listen to up to 13 frequencies/bands simultaneously
- WebSDR and OpenWebRX allow the user to experience all these modes without:
 - A receiver of their own
 - A sound card interface to their PC
 - A host of different PC applications for the modes of interest

Alternatives to WebSDR

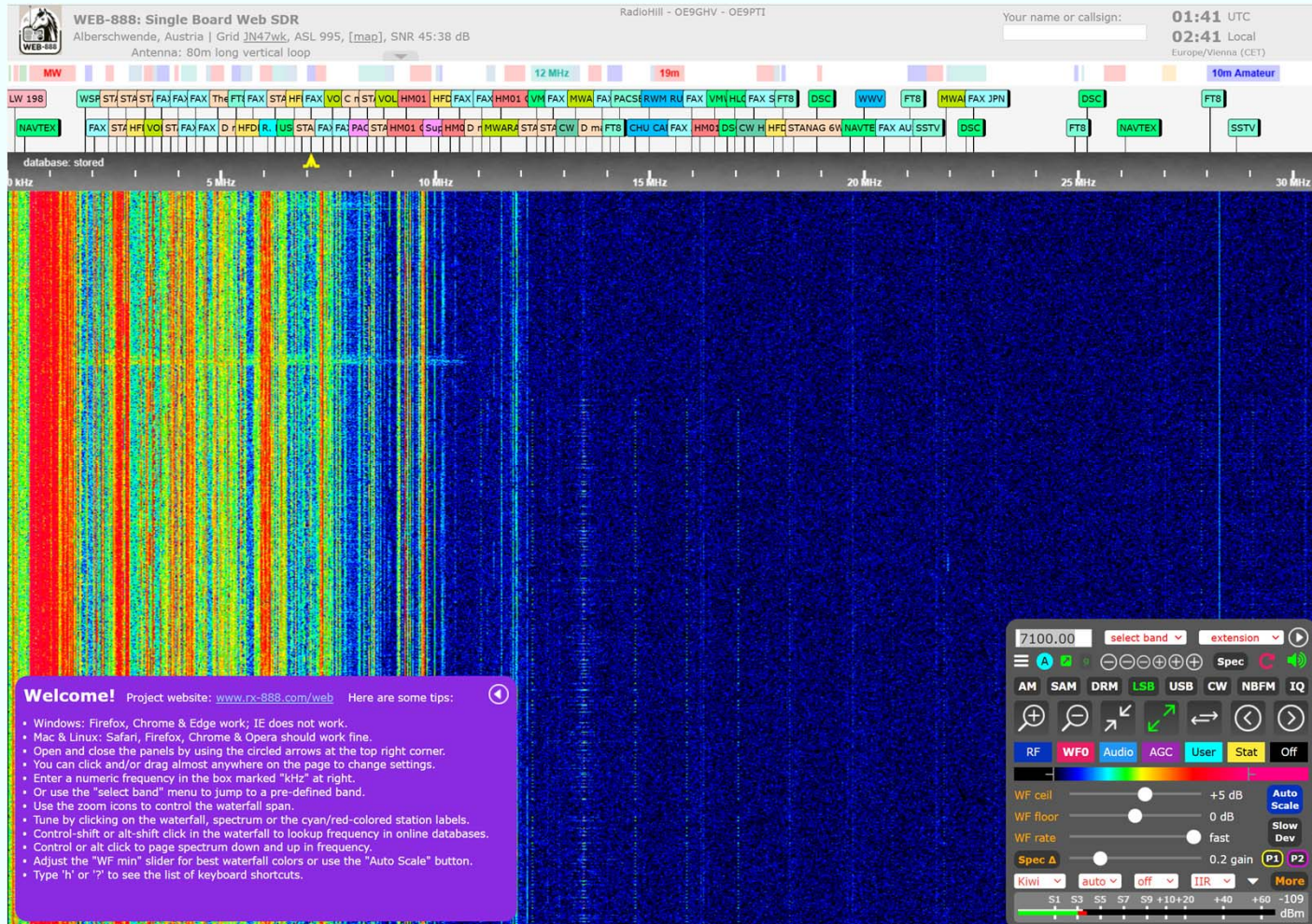
- OpenWebRX: <https://www.openwebrx.de/>
 - Multiuser SDR Receiver implementation
 - More active development than WebSDR
 - Team is rapidly adding support for different modulation modes and CODECs
 - Decoding is implemented in the SDR receiver, not on the client side
 - WebSDR-like user interface
 - Images for Debian, Ubuntu, Docker and Raspberry Pi
 - Documentation: <https://github.com/jketterl/openwebrx/wiki>
 - Receiver List: <https://www.receiverbook.de/>
 - Web-888 SDR Receiver is a plug-and-play implementation
 - Like WebSDR, top banner on linked server's page shows server hardware type, owner's callsign, grid square, location, antenna type and elevation:



WebSDR UI:



OpenWebRX UI:



Finding WebSDR Servers

- A list of currently active WebSDR servers in on <http://www.websdr.org/>

Currently there are 145 servers active, with 1763 users and 676 MHz of radio spectrum.

Filter band: and region: and ☐ mobile support and covering MHz.

Location and URL	Frequency range	Antenna
 WebSDR at the University of Twente, Enschede, NL http://websdr.ewi.utwente.nl:8901/ JO32KF; 676 users	0.000 - 29.160 MHz	Mini-Whip
 WebSDR Maasbree Netherlands (Low): rural low noise level, 160m/80m/60m/40m/30m/20m/17m/15m band, CW segments included http://sdr.websdrmaasbree.nl:8901/ JO31ai59; 117 users	1.799 - 1.991 MHz	Low noise active receiving loop and GPS locked RX888MKII
	3.468 - 3.852 MHz	
	5.277 - 5.469 MHz	
	6.908 - 7.292 MHz	
	10.054 - 10.246 MHz	
	13.983 - 14.367 MHz	
	18.022 - 18.214 MHz	
	20.841 - 21.609 MHz	
 BATC & AMSAT-UK QO-100 (Es'Hail-2) Geostationary Satellite WebSDR http://eshail.batc.org.uk:8901/ IO70JB; 53 users	10489.500 - 10490.000 MHz	1.3m Dish -> GPS-locked Octagon LNB -> Airspy Receiver
 * RD3MK * Yaroslavl * Regional branch of the Union of Radio Amateurs of Russia http://websdr.srr76.ru/ KO97XP; 45 users	436.276 - 438.324 MHz	Inv.V antenna for each band
	144.000 - 146.048 MHz	
	27.876 - 29.924 MHz	
	20.588 - 21.612 MHz	Inv.V
	13.338 - 14.362 MHz	Inv.V antenna for each band
	6.558 - 7.582 MHz	
	2.938 - 3.962 MHz	
	1.288 - 2.312 MHz	

1

2

3

4

Finding WebSDR Servers (cont.)

- World of Receivers and Transmitters Table: <https://rx-tx.info/table-sdr-points>

Table of SDR Receivers

Displaying 1 - 50 of 1948

Frequency Band Country Search Type

	Title ▲	Band	Country	City	QTH	Type
1	" SAN JUAN, ARGENTINA / LU6PSG	HF	Argentina	San Juan	FF58rk	WebSDR
2	"Station B" #1 Canterbury UK	VLF, LF, MF, HF	United Kingdom	Chartham	JO01lh	KiwiSDR
3	"Station B" #2 Canterbury UK	VLF, LF, MF, HF	United Kingdom	Chartham	JO01lh	KiwiSDR
4	"THIS IS SPARTA SDR" Low-HF/SDR by SV3GCB with RTL Receivers and Dedic...	MF, HF, VHF	Greece	Spárti	KM16fx	WebSDR
5	##VK3JTM 18m loop Ararat Vic Australia##	VLF, LF, MF, HF	Australia	Ararat	QF12lr	KiwiSDR
6	* RD3MK * Yaroslavl * Regional branch of the Union of Radio Amateurs of Russia	MF, HF, VHF, UHF	Russian Federation	Yaroslavl	KO97xp	WebSDR
7	* RN3KK * VORONEZH * Regional branch of the Union of Radio Amateurs of Russia	MF, HF	Russian Federation	Maslovka	KO91om	WebSDR
8	* RTL-SDR v4 receiver station (w/ adjustable gain) - Beskid Niski, Polska	VLF, LF, MF, HF, VHF, UHF	Poland	Jasło	KN09rs	OpenWebRX
9	- DF5VL - Web SDR - 0.1-30 Mhz Germany, Puettlingen / Saarland	LF, MF, HF	Germany	Püttlingen	JN39kh	KiwiSDR
10	- Freebands - Bordeaux (France) 11m / 446 Mhz / Etc ..	HF	France	Mérignac	IN94qu	WebSDR
11	- Ham - Bordeaux (France) 80m / 40m / 20m / 15m / 10m / 144 Mhz / 433 Mhz / Es...	HF, VHF, UHF, SHF	France	Saint-Morillon	IN94rp	WebSDR
12	- LU5DNP - Saladillo City - Bs. As. R.Argentina	HF, VHF	Argentina	Saladillo	GF04ci	WebSDR
13	- PGH PA - us {MF HF VHF UHF}	MF, HF, VHF, UHF	United States	Oakdale	EN90vk	OpenWebRX
14	- SDR 1- Plonsk, Poland	LF, MF, HF	Poland	Płońsk	KO02eo	KiwiSDR

Finding WebSDR Servers (cont.)

- World of Receivers and Transmitters Map: <https://rx-tx.info/map-sdr-points>

Map of SDR Receivers

Displaying 1 - 1948 of 1948

[illegible]

Finding OpenWebRX Servers: <https://www.receiverbook.de>

Receiver list

Filter by receiver type...

Filter by frequency or band...



POLAND, OLSZTYN PZK

[SR4DON OLSZTYN/POLAND 17m-160m](#)
OpenWebRX 1.2.71
HAM radio Broadcast services

[SR4DON OLSZTYN/POLAND 70cm/2m/4m/6m/8m/10-15m](#)
OpenWebRX 1.2.76
HAM radio Broadcast services Public two-way radio



SDRPT

[SDRPT 2 - WebSDR VHF/UHF/CB/10m/QO100](#)
OpenWebRX 1.2.76
HAM radio Public two-way radio

[SDRPT 0-32 MHz SDR - <https://sdrpt.pt> | Santarem, Portugal](#)
KiwiSDR 1.663.0
HAM radio Broadcast services Public two-way radio

[SDRPT 3 - Air band](#)
OpenWebRX 1.2.73



Bedford, England

[Bedford UK 0-30 MHz V1 KiwiSDR](#)
KiwiSDR 1.803.0
HAM radio Broadcast services Public two-way radio

[Bedford OpenWebRX+ SDRPlay RSP1A LF/MF/HF/VHF/UHF
 + RTL-SDR Blog V3 for ABS-D Open Map to view Plots](#)
OpenWebRX 1.2.76
HAM radio Broadcast services Public two-way radio

[Barney's Websdr #1 LF/MF/80m & 40m Bedford England](#)
WebSDR
HAM radio Broadcast services

[Bedford UK 0-30 MHz V2 KiwiSDR](#)
KiwiSDR 1.803.0
HAM radio Broadcast services Public two-way radio

Web-888 Online SDR Server List

- <https://www.rx-888.com/web/rx.html>

SDR Devices

👤 rx-888 team ⌚ Less than 1 minute

Public Device List (Refresh every 15 minutes)

0-30 MHz SDR | Alberschwende, Austria

<http://kiwi.oe9.oevsv.at:8077> ↗

1/13 users, SNR(All,HF) 45,38 dB

HF

0-30 MHz SDR testing | France (center)

<http://82.65.21.17:8073> ↗

1/13 users, SNR(All,HF) 44,40 dB

HF

0-30 MHz SDR | REUTE/AR SWITZERLAND

<http://62.2.184.6:8073> ↗

2/5 users, SNR(All,HF) 41,38 dB

HF

K1VL - Shrewsbury, Vermont, USA - 36+ receivers

<http://sdr.k1vl.com:8078> ↗

5/11 users, SNR(All,HF) 40,35 dB

eHF

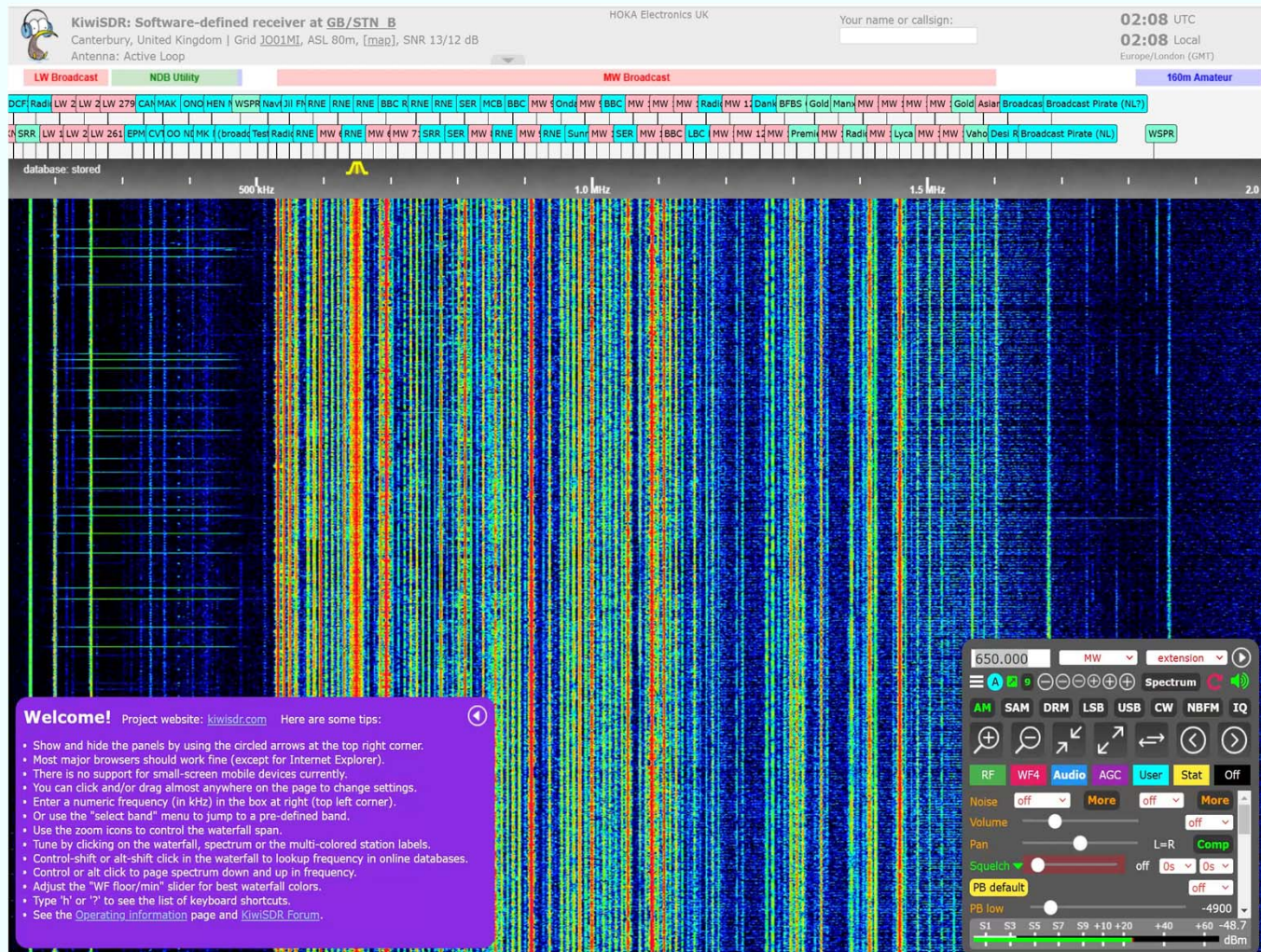
RHA Raisio Finland SDR

<http://rha.proxy.rx-888.com:8073> ↗

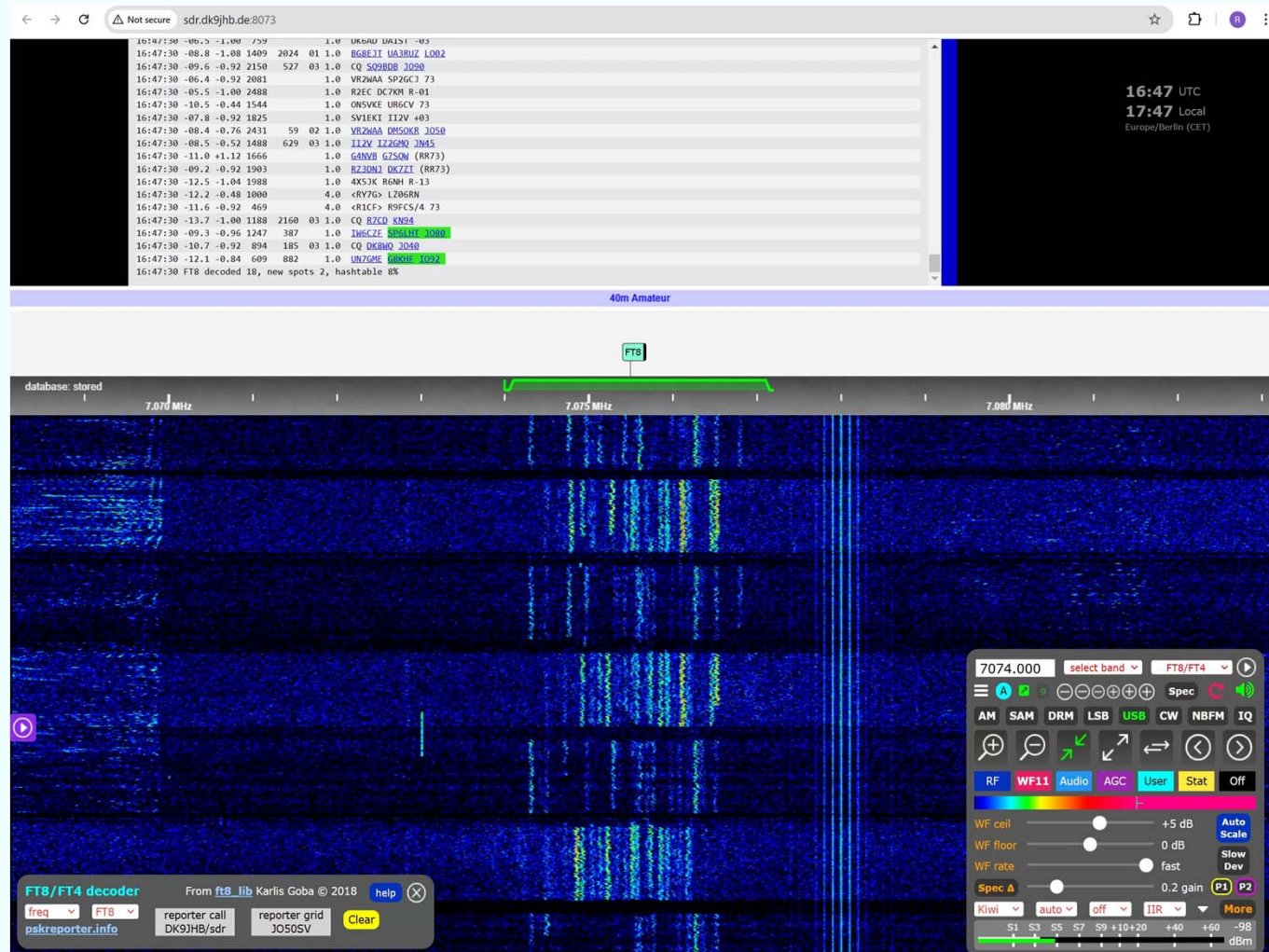
0/11 users, SNR(All,HF) 40,40 dB

HF

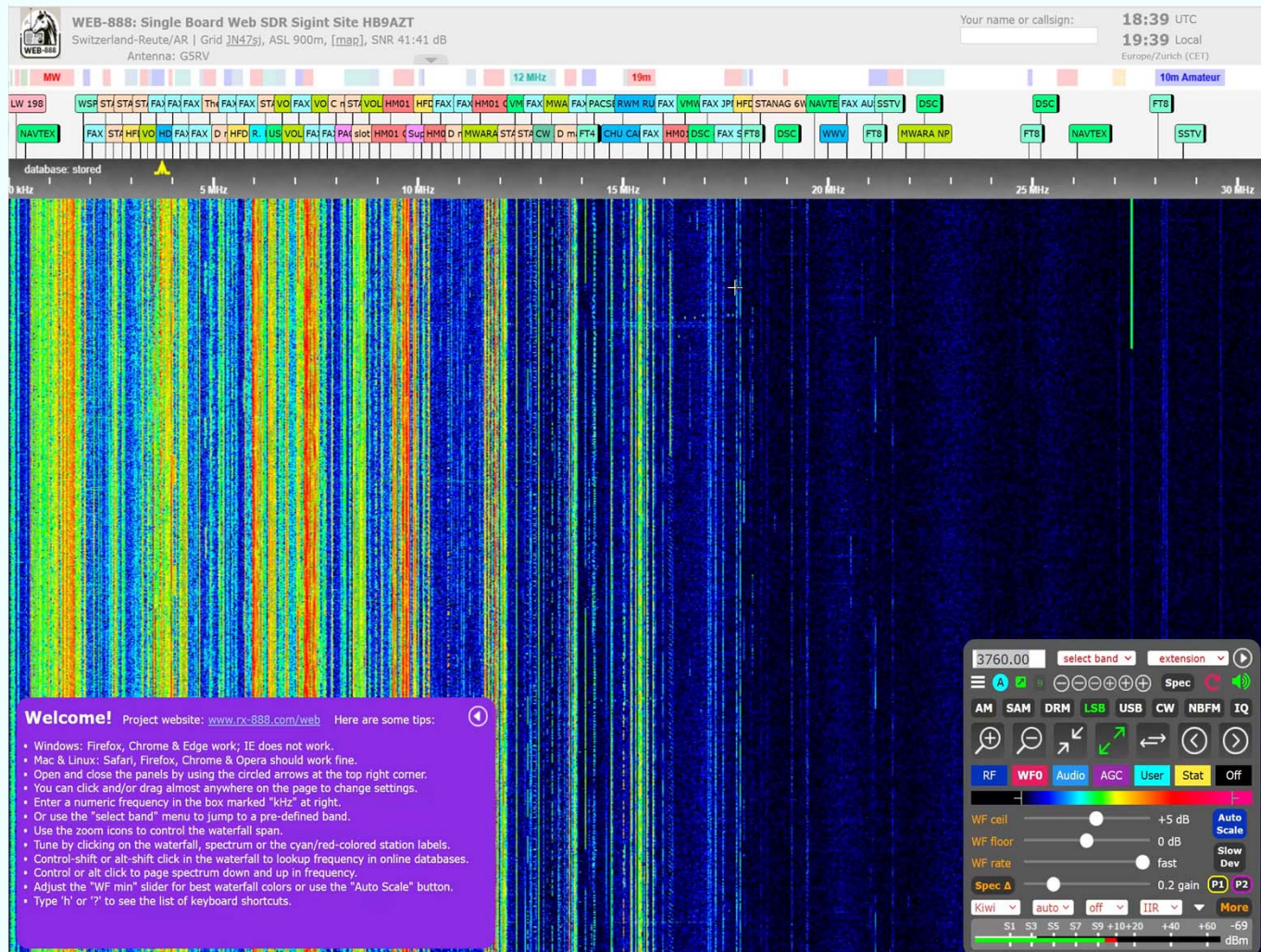
WebSDR Demo Video (Canterbury, UK MW):



OpenWebRX Demo Video (Jena, DE 40m FT8):



OpenWebRX Demo Video (Reute, CH 80m QSO):



Resources

- WebSDR organization:
 - <http://websdr.org/>
- World of Receivers and Transmitters Table of SDR Receivers:
 - <https://rx-tx.info/table-sdr-points>
- World of Receivers and Transmitters Map of SDR Receivers:
 - <https://rx-tx.info/map-sdr-points>
- WebSDR Receiver User Manual:
 - <http://lu5dnpwebsdr.sytes.net:8901/guia/guide.html>
- WebSDR Quick Start Guide:
 - <https://peanutpower.co.uk/wp-content/uploads/2016/11/Guide-to-using-WebSDR-v20161125.pdf>
- WebSDR FAQs:
 - <https://www.websdr.org/faq.html>
- Sherwood Engineering Receiver Test Data:
 - <http://www.sherweng.com/table.html>

Q&A