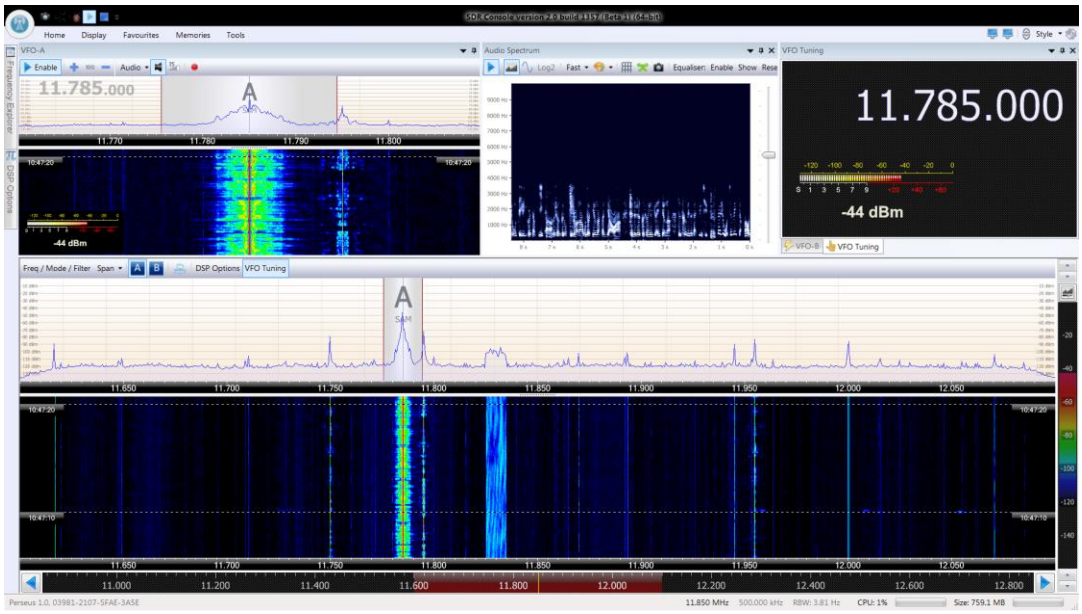


SDR Console (V2)

The ultimate software for your SDR station

SDR-RADIO.com

Table of Contents

Contents

1 Introduction

Welcome to the second generation SDR console from SDR-Radio.com. This new console takes the technology developed in version 1 and adds many improvements to bring you the most advanced SDR solution available today.

The main focus is traditional receivers for HF, UHF and higher.

1.1 System Requirements

This software is design for Windows only. Although the software runs on Core 2 Duo systems with 32-bit Windows XP, the recommended minimum system configuration for a new hardware acquisition is:

- Windows 7 64-bit,
- Intel I3,
- 8GB RAM.

To ensure support for SDR solutions coming to market over the next few years a third-generation CPU such as i5-3570 or i7-3770 should be used as these new SDR receivers will offer bandwidths of 20MHz or more which in turn require significant processing power.

Newer computers generally use less power; have better processing and often a lower footprint.

1.2 Licence

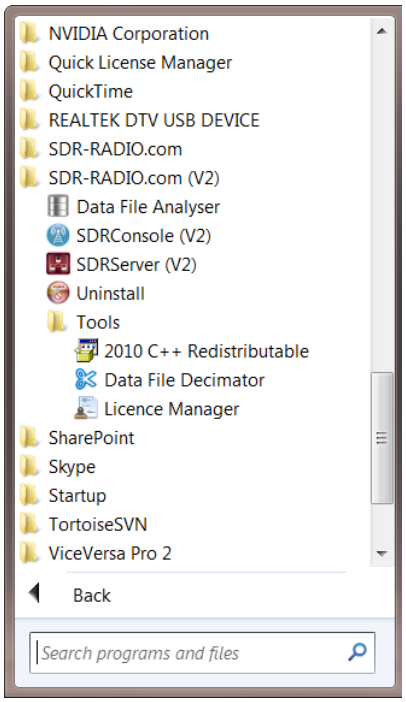
This program requires a licence key. When downloaded the built-in licence is automatically activated. For more information about licencing see page 40.

1.3 Installing

Download the latest kit, start the installation, accept all defaults. The default installation folder is:

- *C:\Program Files (x86)\SDR-RADIO-PRO.com* on 32-bit systems and
- *C:\Program Files\SDR-RADIO-PRO.com* on 64-bit systems.

1.3.1 2010 C++ Redistributable



If an essential C++ or Microsoft foundation class (MFC) dll is not found on your computer you are prompted to install this kit; without these dlls the software will not run! If you need to install this kit at a later date you will find it in the Windows Start menu.

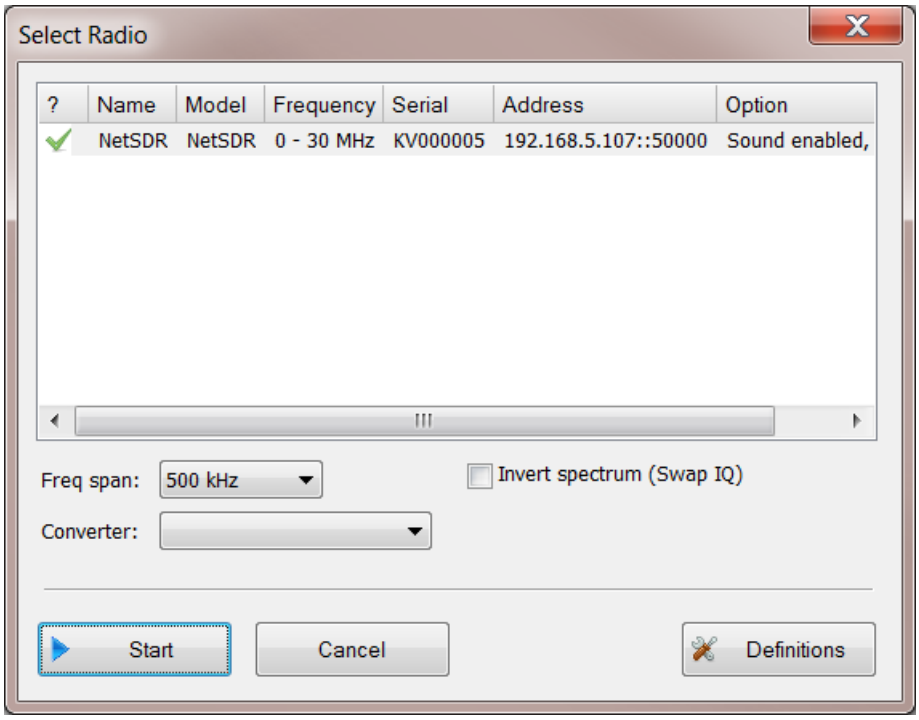
"The Microsoft Visual C++ 2010 Redistributable Package installs runtime components of Visual C++ Libraries required to run applications developed with Visual C++ on a computer that does not have Visual C++ 2010 installed.

This package installs runtime components of C Runtime (CRT), Standard C++, ATL, MFC, OpenMP and MSDIA libraries."

2 Starting

When you start the console the layout and appearance is restored from the previous session (if any).

To start a radio you select *Radio* from the ribbon bar. The *Select Radio* window is displayed. If you do not have any radio definitions you are prompted to open the *Radio Definitions* window, alternatively just press the Definitions button to modify your definitions.



In the above example a definition exists for n RFSpace NetSDR radio.

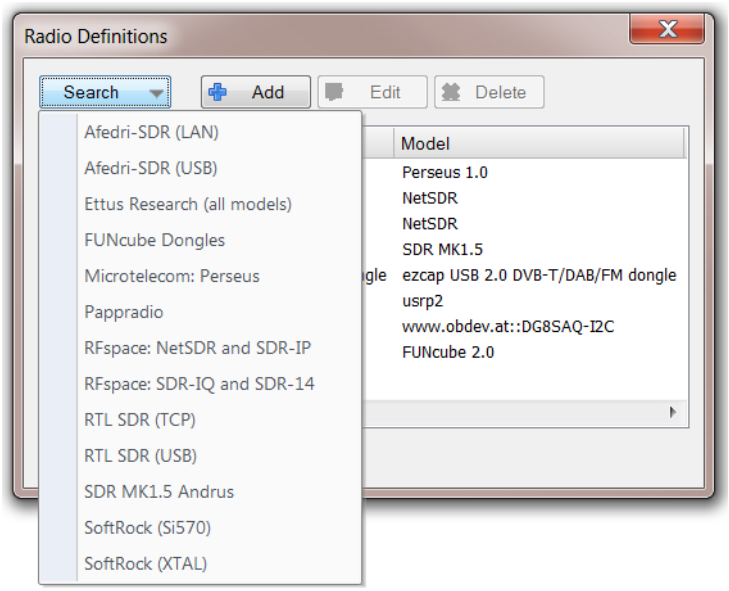
1. Select the radio definition to start,
2. Select a frequency span
3. I (the frequency bandwidth returned by the radio),
4. Press *Start*.

Note: a higher frequency span will require more data processing, so if using an older or under-powered computer select only the required span.

If the display appears to be inverted then select the Invert spectrum (Swap IQ) check box.

2.1.1 Definitions

To manage the list of radio definitions click the Definitions button. From the *Search* button select the radio model to be added. After a few seconds a popup window is displayed with the results of the search.

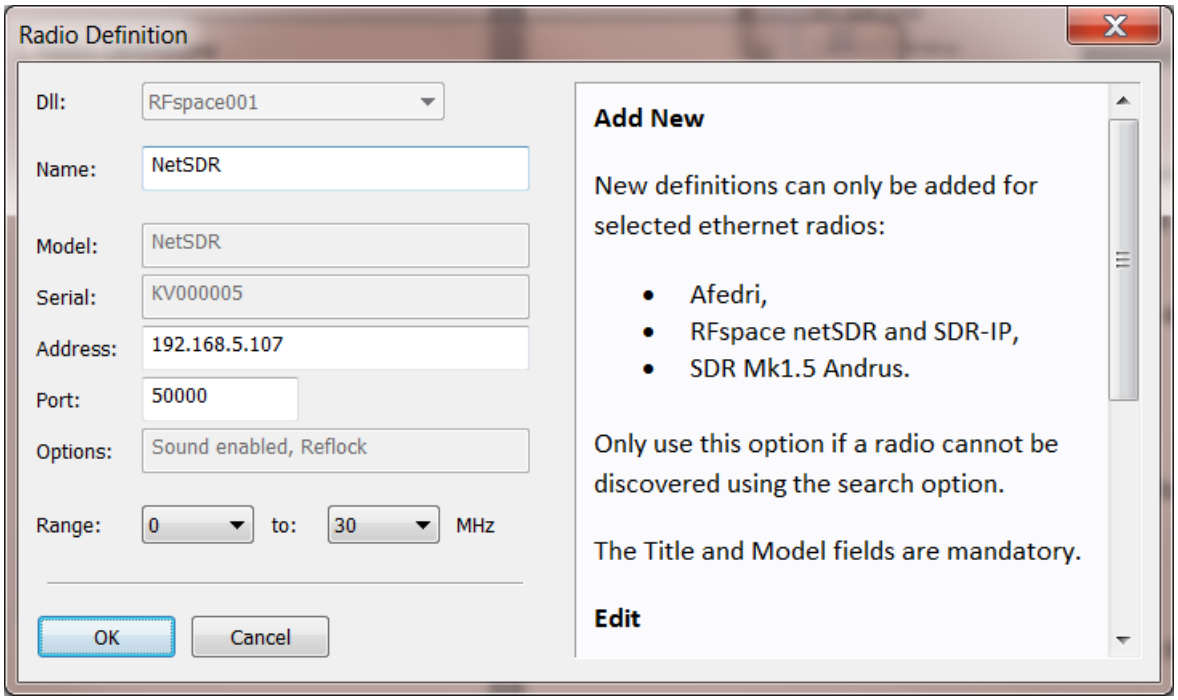


If the radio is connected via the network – for example the RFspace NetSDR – then make sure than any firewall is either disabled or correctly configured to allow TCP and UDP traffic through on the ports used by the radio.

If the search option does not find the radio you can use the Add option to add a networked definition manually (you cannot add a definition for a USB or soundcard-based radio).

2.1.1.1 Frequency Range

A default frequency range is added as part of the definition. To change this range highlight the definition and press *Edit*.



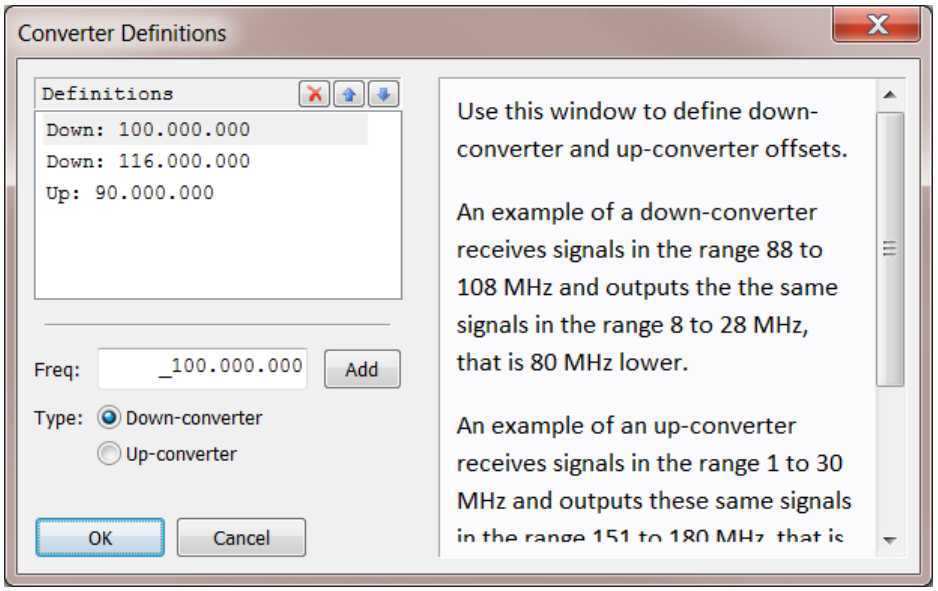
With the Edit option you can change any field in the radio definition.

2.1.2 Converters

If you are using a down-converter, for example converting 144-146MHz to 28-30MHz select this from the *Converter* dropdown.

2.1.2.1 Definitions

Select Manager from the dropdown to display the Converter Definitions window.



Use this window to define down-converter and up-converter offsets. Simply enter the frequency difference and select down-converter or up-converter.

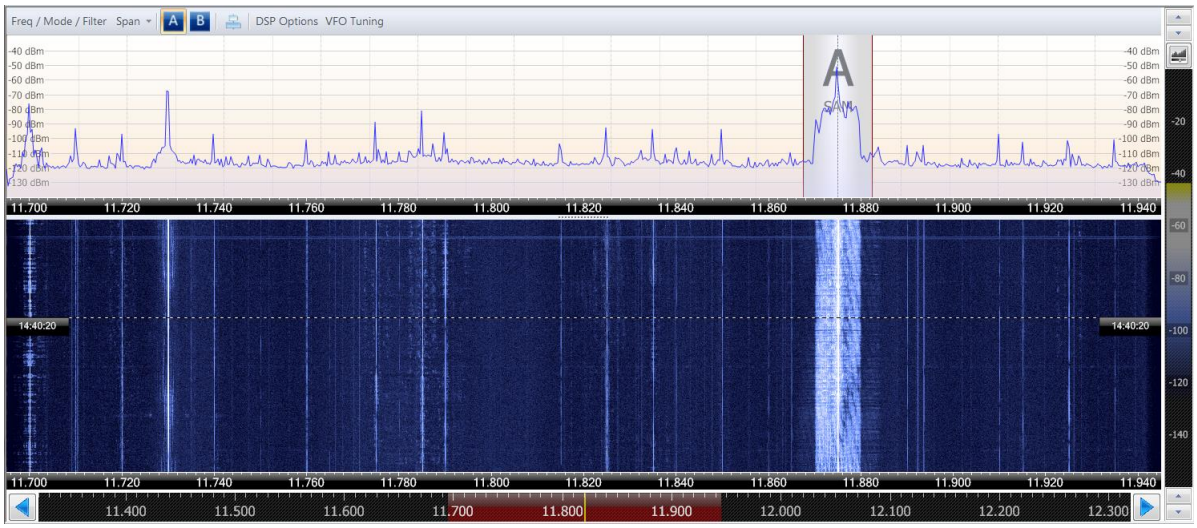
Down-Converter

An example of a down-converter receives signals in the range 88 to 108 MHz and outputs the same signals in the range 8 to 28 MHz, that is 80 MHz lower.

Up-Converter

An example of an up-converter receives signals in the range 1 to 30 MHz and outputs these same signals in the range 151 to 180 MHz, which is 150 MHz higher.

3 Main Display



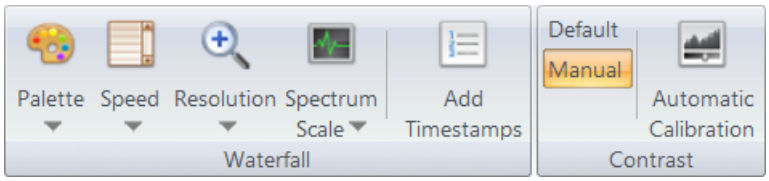
The main display window gives you a full overview of the signals in radio's span. To change the display span select an option from the Span button in the toolbar.

3.1 VFO Selection

Select the active VFO with the blue A, B… buttons in the toolbar. The active VFO is highlighted; this is the VFO whose frequency is adjusted by clicking and dragging the VFO bar with the left mouse button.

3.2 Display Quality

The waterfall display options are selected from the *Display* pane in the ribbon bar.



3.2.1 Palette

The palette is the colour scheme; just select whichever you find the most pleasing.

3.2.2 Speed

The number of lines per second, the default is 20. Due to the mathematics of FFT computation a faster display results in a lower quality display (see also Resolution).

3.2.3 Resolution

By using FFT Overlaps the resolution of the display is increased as the expense of more CPU usage. An additional side-effect of increased resolution is increased blurring in the time domain (vertical axis), however you will normally be more interested in higher frequency resolution.

3.2.4 Spectrum Scale

Adjust the spectrum scale to enhance the signals in the visible portion of the spectrum scope.

3.2.5 Timestamps

Adds timestamps to the waterfall display.

3.2.6 Contrast

There are two options which are selected from the *Contrast* panel in the ribbon bar's *Display* pane, Default and Manual.

Default

Default uses an advanced algorithm to enhance as much data as possible.

Manual

Manual gives full control to the user using the selection window to the right of the display. Use the mouse to adjust the contrast range.

4 Tuning

There are several ways you can adjust the radio's frequency.

- Main tuning bar,
- Frequency explorer,
- Band definitions,
- Direct entry.

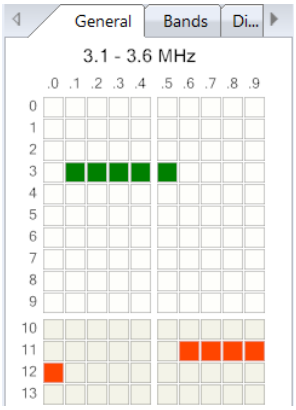
4.1 Main Tuning Bar

This is displayed at the bottom of the main window.

The current display span is shown in red; the yellow vertical line indicates the centre frequency. Drag the span at either the left or right edge of the red bar. Change the centre frequency by dragging the bar.

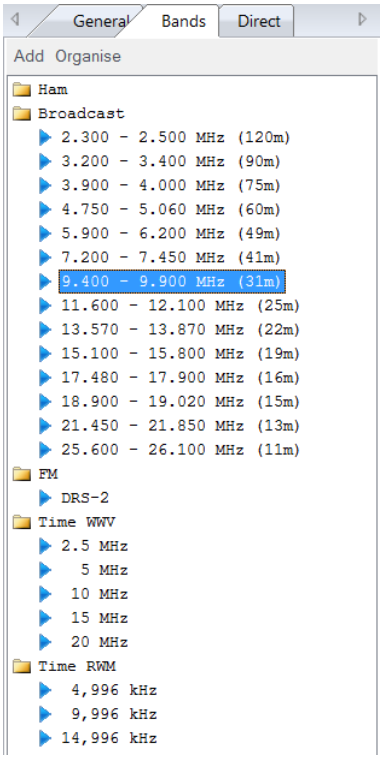
4.2 Frequency Explorer

The explorer gives you a quick indication of the current span relative to the radio's frequency range.



The current display span in the main window is shown in red, as you move your mouse over the grid the corresponding span is shown in green; select this span by clicking with the mouse's left-button.

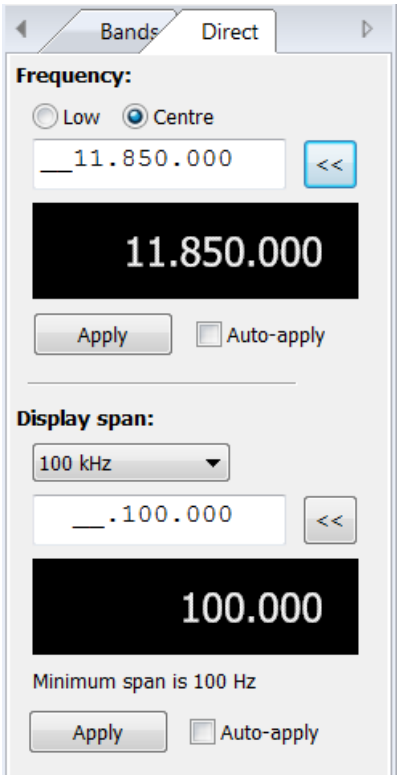
4.3 Band Definitions



Bands are exactly that – bands of frequency spectrum. To define the bands click Organise to display the Bands Organiser.

The Organiser has an intuitive interface which you use to manage the definitions and control the order in which they are displayed.

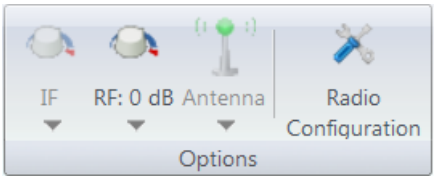
4.4 Direct Entry



Use this option to change the centre frequency and span. Use the chevron (<<) buttons to select the current frequency or span.

5 Radio Options

Radio options are selected from the *Options* panel in the ribbon bar *Home* pane.

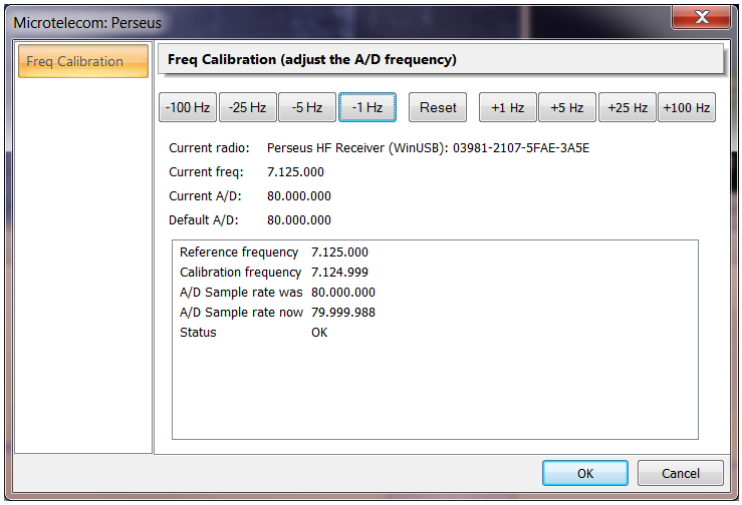


The available options depend on the currently started radio.

- IF gain
- RF gain
- Antenna selection
- Radio Configuration

5.1 Radio Configuration

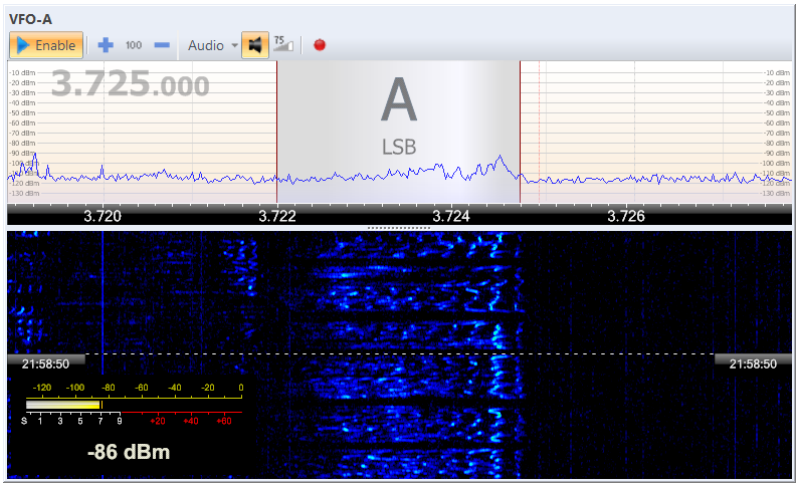
The configuration options depends on the currently started radio, this example is for the Perseus.



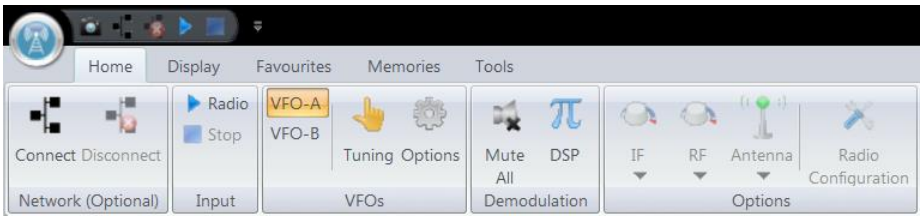
6 VFOs

The term VFO stands for variable frequency oscillator, in SDR software a window where you select a frequency for further processing such as demodulation, decoding etc.

The console supports up to six VFOs which can be enabled independent of each other.



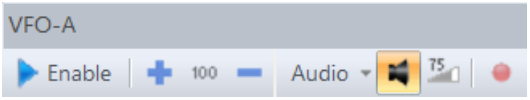
6.1 Selection



In the ribbon bar select the *Home* pane to display the VFO options. By default only two VFOs (A and B) are enabled; to enable more VFOs select *Options*, the *VFOs* | *Basic* page controls the available VFOs.

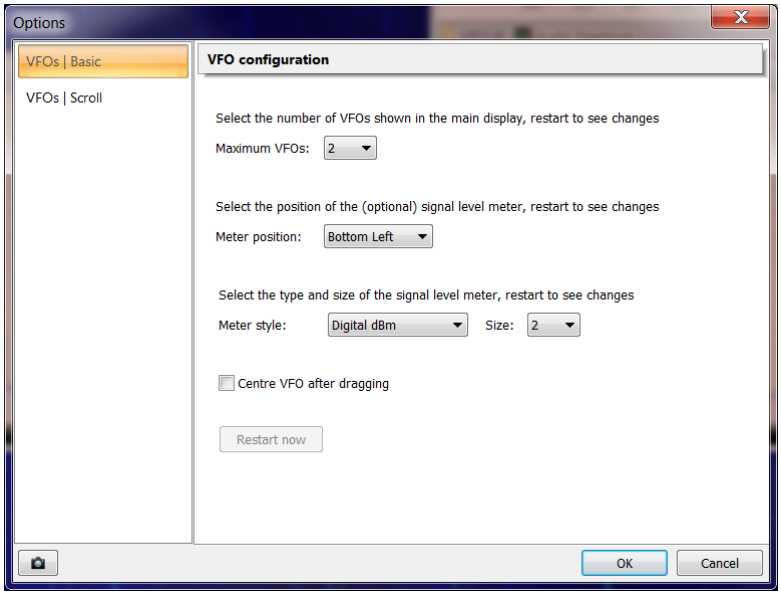
6.1.1 Enabling

A VFO must be enabled (started) before you can tune, to enable a VFO click the Enable button in the VFO's toolbar. The VFO's frequency must be within the range currently returned by the radio, otherwise nothing is displayed and nothing is heard (no audio).



6.2 Options

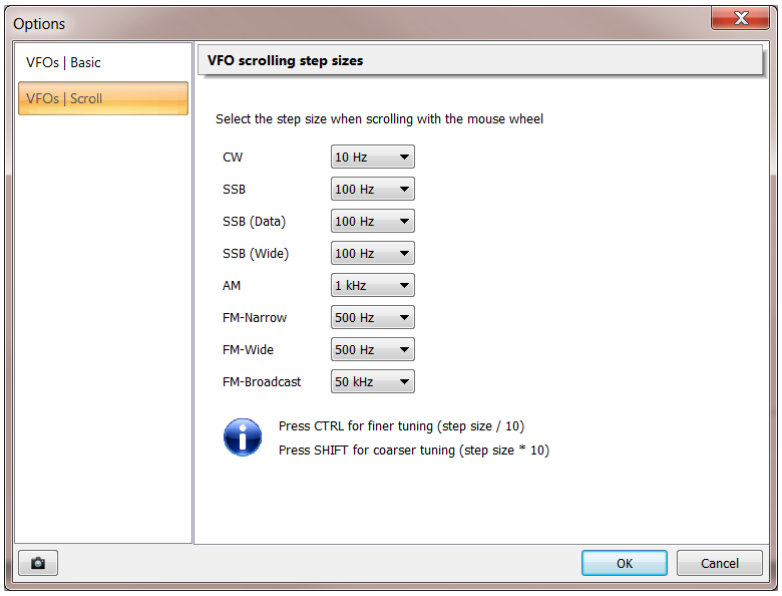
6.2.1 VFOs | Basic



Here you select:

- Number of visible VFOs,
- Position of the signal strength meter,
- Style and size of the signal strength meter,
- Whether the VFO should be centered on the demodulation frequency after the user has finished dragging the filter bar.

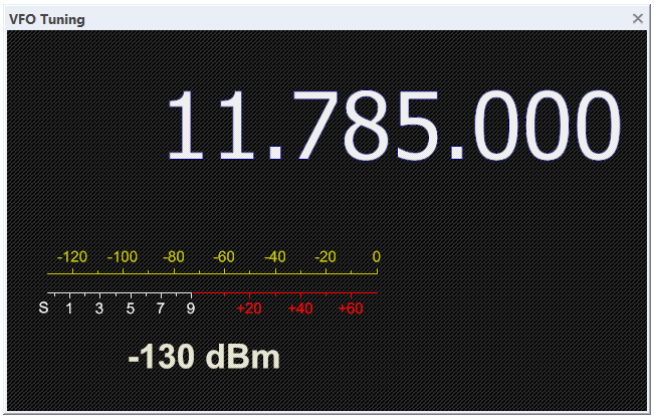
6.2.2 VFOs | Scroll



Here you select the step size when scrolling with the mouse wheel. Values are saved for each mode.

- Press CTRL for finer tuning (step size / 10).
- Press SHIFT for coarser tuning (step size * 10).

6.3 Tuning



Select *Tuning* to display the large tuning window where:

- You enter the frequency, and
- A larger signal strength meter is displayed.

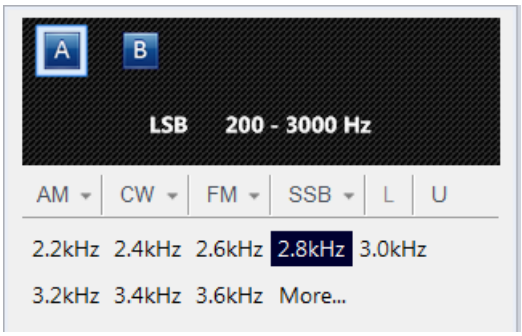
To adjust the frequency, position the cursor over a digit, then:

- Click with the left mouse button to increment,

- Click with the right mouse button to decrement,
- Scroll the mouse wheel to adjust up/down.

6.4 Mode & Filter

All common audio modes are supported; for each mode a preset list of filters widths is available. To display this window just select the Freq / Mode / Filter button on the centre toolbar.



This windows shows both VFO-A and VFO-B are available, the current VFO being VFO-A. The current mode is LSB (lower sideband), the filter width is 2,800Hz (from 200 to 3000 Hz).

The ‘L’ and ‘U‘entries in the menu select the Lower or Upper sideband variant of the current mode.

6.4.1 Mode

To change the mode select an option from the AM, CW … menu.

6.4.1.1 AM

There are several AM demodulators:

- Basic AM
- Synchronous AM (SAM)
- Exalted-carrier selectable-sideband (ECSS)

The most commonly used is SAM.

6.4.1.2 CW

Two versions of CW are available:

1. Lower sideband, and
2. Upper sideband.

Normally you use upper sideband, the CW pitch (see Modes on page 48) is shown in the VFO window to aid tuning. Demodulation for CW is the same as SSB.

6.4.1.3 FM

Various variants of FM are available: narrow, wide and broadcast.

6.4.1.3.1 Narrow FM

Bandwidth maximum 16 kHz, high-pass filter 150Hz (to remove CTCSS and similar access tones), 60us de-emphasis.

6.4.1.3.2 Wide FM

Bandwidth maximum 48 kHz, no high-pass filter, no de-emphasis.

6.4.1.3.3 Broadcast FM

Bandwidth maximum 192 kHz, 15kHz low-pass filter, either 50us or 75us de-emphasis (depending on Region, see page 51).

6.4.1.3.4 Stereo FM

The same as broadcast FM except a stereo demodulator is used. See also FM Stereo on page 35.

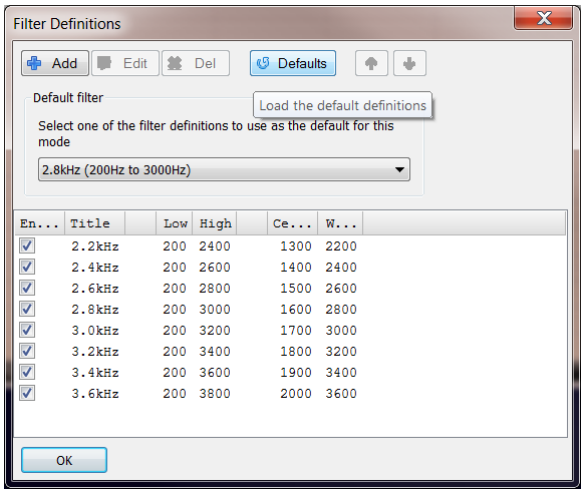
6.4.1.4 SSB

All common SSB variants are supported:

- lower sideband,
- upper sideband,
- double sideband.

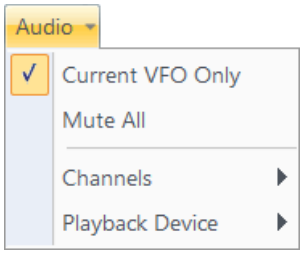
6.4.2 Filter

When you change the mode your preset list of filter widths is updated for the new mode selection. Click *More…* to display the *Filter Definitions* window.



You can also change the filter by simply dragging the edges of the filter bar in the VFO window's scope.

6.5 Audio



The audio menu in the VFO window is used to select:

- Enable audio for the current VFO only (if not checked than audio is enabled for all VFOs which are not muted).
- Mute all VFOs.
- Channels – left, right or left and right.
- Soundcard and driver type.

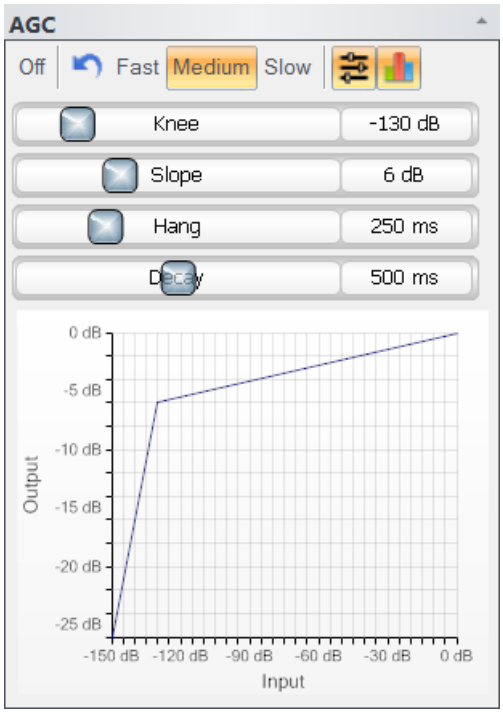
6.6 DSP Options

All the common digital signal processing (DSP) options are available:

- Automatic gain control (AGC),

- CW peak filter,
- Noise blanker,
- Noise reduction,
- Notch,
- Squelch

6.6.1 AGC



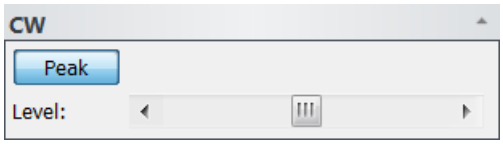
Automatic gain control (AGC) is an adaptive system found in many electronic devices. The average output signal level is fed back to adjust the gain to an appropriate level for a range of input signal levels. For example, without AGC the sound emitted from an AM radio receiver would vary to an extreme extent from a weak to a strong signal; the AGC effectively reduces the volume if the signal is strong and raises it when it is weaker. (From Wikipedia, the free encyclopedia.)

The AGC system in this software has three presets which are fully adjustable:

- Knee – the minimum signal level at which the AGC is applied. Below this value there is no AGC.
- Slope – the increase in out as the input signal varies between the lower threshold (knee) and 0dB.

- Hang – the AGC is inactive for the hang time after a signal peak caused AGC gain reduction.
- Decay – the time taken for the AGC gain to drop down to zero.

6.6.2 CW Peak

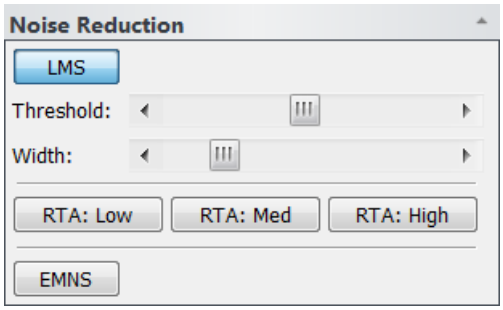


The CW peak filter is a very simple infinite impulse response (IIR) peak (resonator) filter. The level slider adjusts the filter gain.

6.6.3 Noise Blanker

The noise blanker is designed to remove impulse noise, for example the 'clicks' generated by an electric fence. The algorithm maintains a moving average of the input signal and removes pulses above a user-definable threshold.

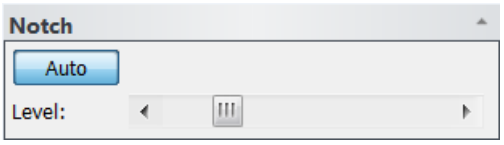
6.6.4 Noise Reduction



There are three noise reduction algorithms in this software:

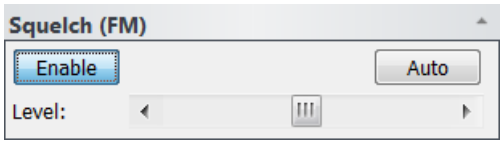
1. LMS uses the Least Mean Square adaptive filtering algorithm. If the input signal exceeds the threshold then the signal is processed.
2. RTA uses algorithms developed by Intel for the Microsoft Real-Time audio codec.
3. EMNS is the Ephraim-Malah Noise Suppressor originally described in *Y. Ephraim and D. Malah. Speech Enhancement Using a Minimum Mean-Square Error Short-Time Spectral Amplitude Estimator. IEEE Trans. ASSP, Vol. 32, No. 6, Dec. 1984, pp. 1109-1121*.

6.6.5 Notch



The notch filter is an Automatic filter with level adjustment. It is based on the Least Mean Square adaptive filtering algorithm used in the noise reduction, for the notch filter the parameters are set so that the constant signal components such as heterodynes are removed.

6.6.6 Squelch



A standard squelch for frequency modulation signals. Squelch support for other forms of signal will be added at a later date.

6.7 Recording

The audio recording options are contained in the Program Options, see page 43 for configuration options.

The audio recorder supports two formats, Windows Media Audio (WMA) and standard WAV. Wma requires less storage and has the advantage that tags can be embedded in the recording.

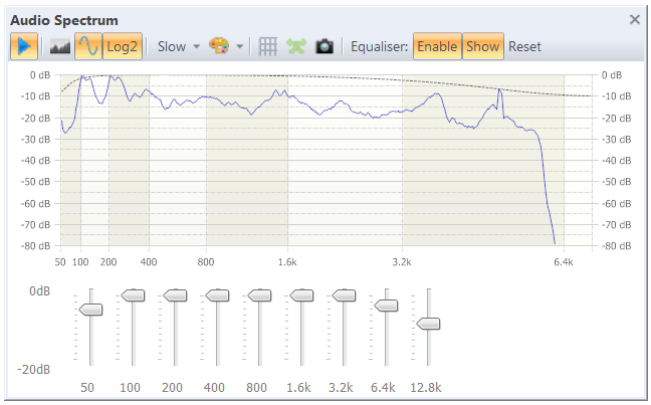
This software does not have an audio player – these are included in Windows and are freely available on the internet.

7 Audio Spectrum

The audio spectrum window serves two purposes:

1. Control the optional graphical equaliser, and
2. Display the audio spectrum.

7.1 Graphical Equaliser



When you select the Show option the equaliser sliders are displayed, the slider range is 20dB. Graphical equalisers are implemented via a series of Biquad IIR filters, one filter per slider.

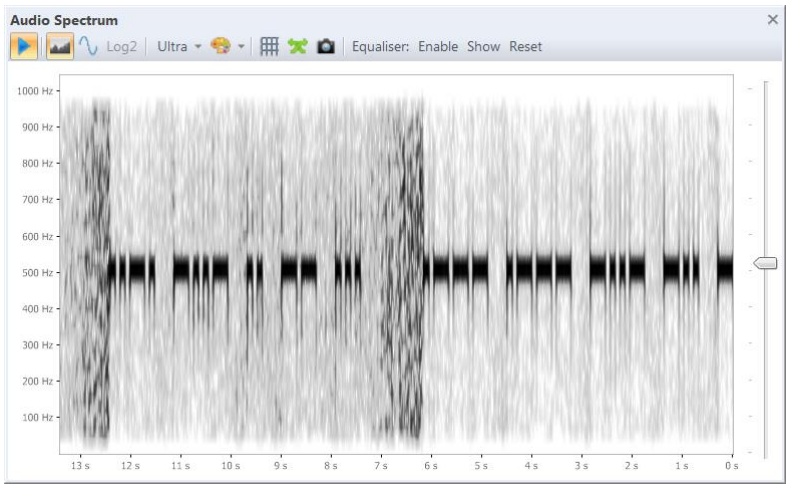
In the above example you see the current spectrum in blue and the theoretical frequency response as a dashed black line.

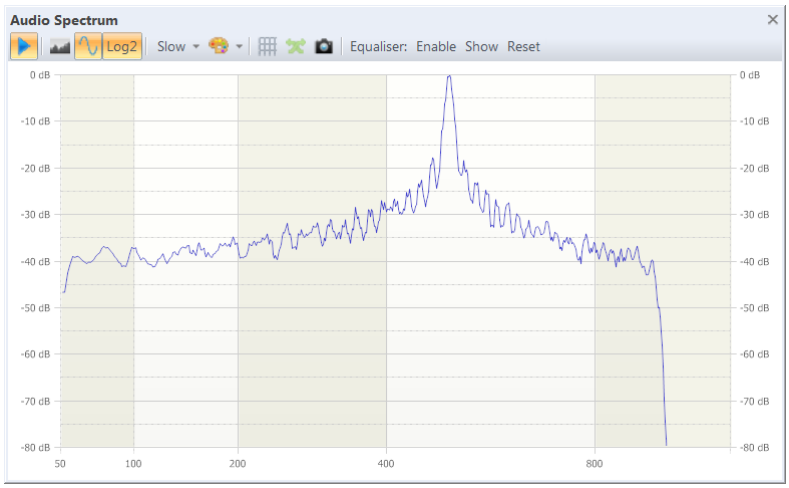
7.2 Display

There are two display formats:

1. Waterfall and
2. Spectrum.

An example of each format is shown below. The Spectrum display has either a linear or logarithmic frequency axis.


Audio Spectrum
Log2
Ultra
Equaliser:
Enable
Show
Reset
1000 Hz
900 Hz
800 Hz
700 Hz
600 Hz
500 Hz
400 Hz
300 Hz
200 Hz
100 Hz
13 s
12 s
11 s
10 s
9 s
8 s
7 s
6 s
5 s
4 s
3 s
2 s
1 s
0 s


Audio Spectrum
Log2
Slow
Equaliser:
Enable
Show
Reset
0 dB
-10 dB
-20 dB
-30 dB
-40 dB
-50 dB
-60 dB
-70 dB
-80 dB
50
100
200
400
800

8 Data Recorder

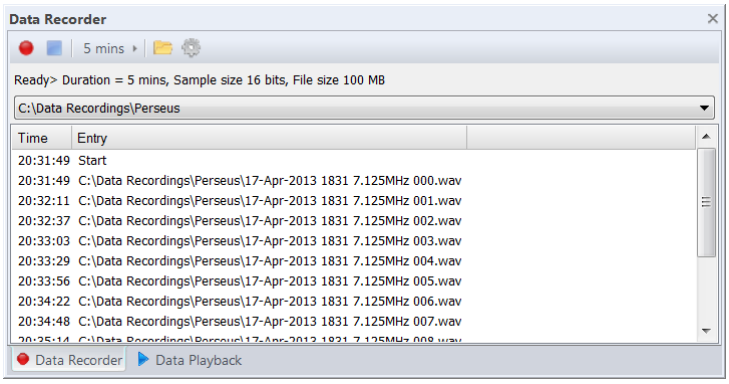
The data recorder saves raw data received from the input source as a series of either

- complex 32-bit floating point values or
- complex 16-bit integer values

in a WAV file (the VITA-49 format will be supported at a later date). These files can be played back and/or analysed as required.

8.1 Recording

The recording options are selected in the program options, see page 44. Select the *Recording* option from the *Display / Data (IQ) Recordings* option in the ribbon bar.



When you make a recording a series of WAV files are created in the selected folder. The filenames contain the data and time of the start of the recording.

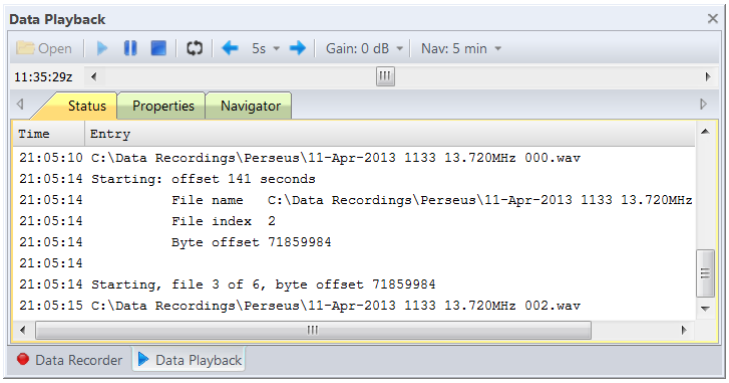
The data size can be computed from this formula:

- Radio bandwidth * 2 (I + Q) * sample size (16-bit or 32-bit).

So if you have a radio bandwidth of 500kHz and a sample size of 32-bits then disk space required per hour is:

- 3600 (seconds per hour) * 500,000 (radio bandwidth) * 2 (I + Q) * 4 (sample size)
- 14,400 megabytes or 14.4 gigabytes.

8.2 Playback

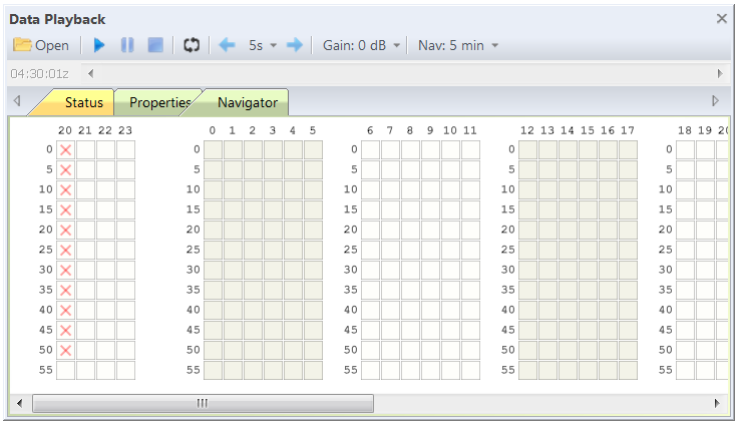


Note: ***you can only play these files with this software, not standard media players***.

Select the *Playback* option from the *Display / Data (IQ) Recordings* option in the ribbon bar.

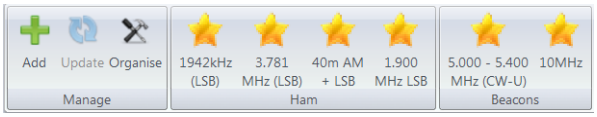
When you play back a recording all the demodulation and display options are available.

You can navigate to a specific time in the playback by selecting the *Navigate* tab.



9 Favourites

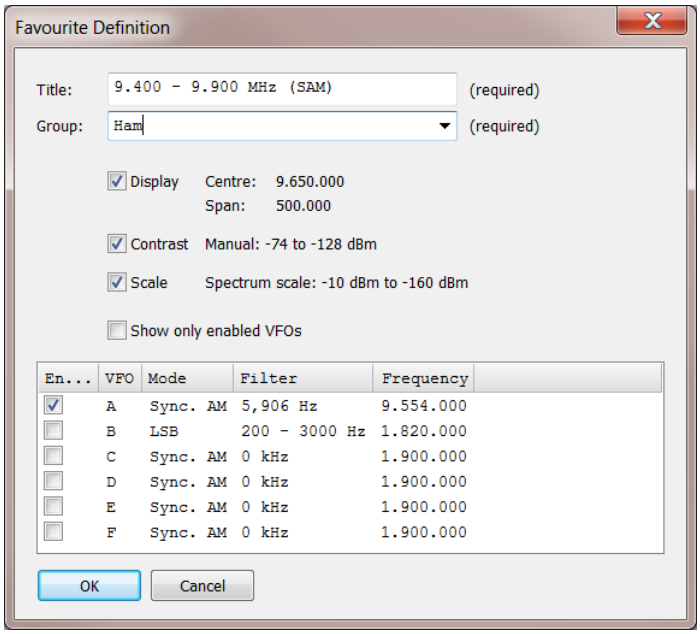
Favourites are displayed in the *Favourites* pane of the ribbon bar.



9.1 Add

Select the Add option to add a new definition which is based on the current settings. The Favourite Definition window selects the properties which are saved in the definition.

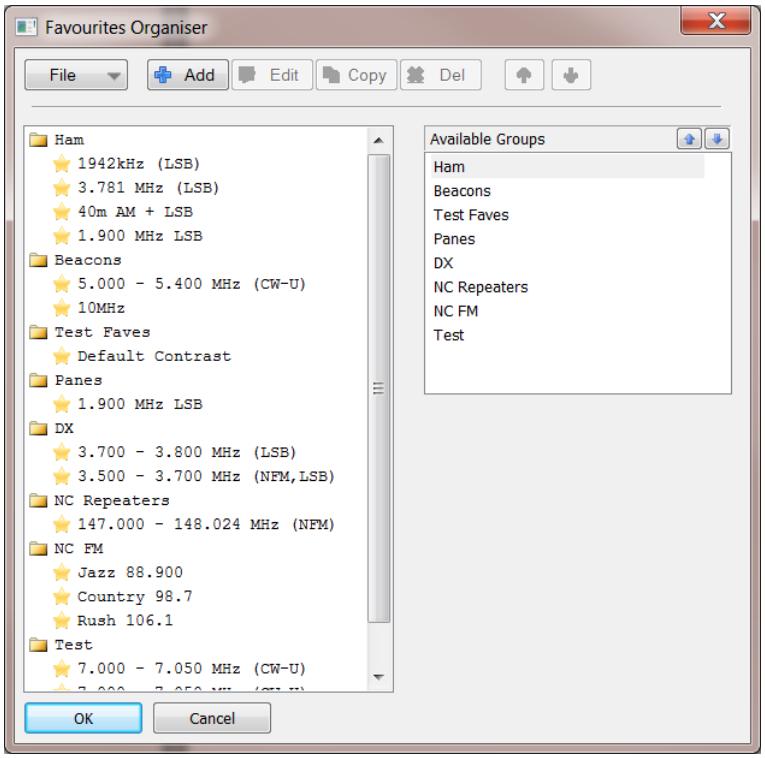
Organise your definitions by use of the Group dropdown – either select an existing definition or just type a new name in this field.



9.2 Organiser

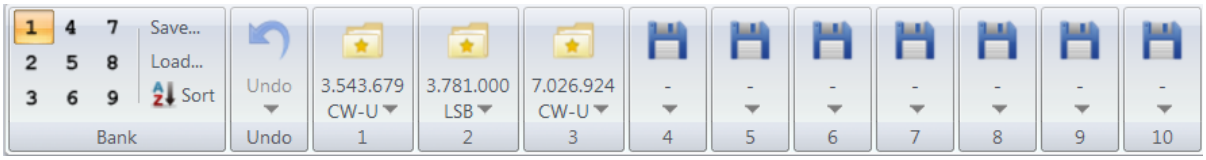
A powerful, yet easy to use window where you organise the Favourites layout display.

To rename a group in the Available Groups list simply double-click on an entry in the list and the format changes to enable editing.


Favourites Organiser
File
Add
Edit
Copy
Del
Ham
1942kHz (LSB)
3.781 MHz (LSB)
40m AM + LSB
1.900 MHz LSB
Beacons
5.000 - 5.400 MHz (CW-U)
10MHz
Test Faves
Default Contrast
Panes
1.900 MHz LSB
DX
3.700 - 3.800 MHz (LSB)
3.500 - 3.700 MHz (NFM,LSB)
NC Repeaters
147.000 - 148.024 MHz (NFM)
NC FM
Jazz 88.900
Country 98.7
Rush 106.1
Test
7.000 - 7.050 MHz (CW-U)
Available Groups
Ham
Beacons
Test Faves
Panes
DX
NC Repeaters
NC FM
Test
OK
Cancel

10 Memories

Memories are displayed in the *Memories* pane of the ribbon bar. There are 9 banks with 10 memories per bank.



10.1 Save

To save the current frequency and mode either:

- Click on a Save icon (the small floppy disk), or
- Select *Save* from the dropdown menu displayed when you click the dropdown arrow.

The memory title is created automatically and cannot be changed.

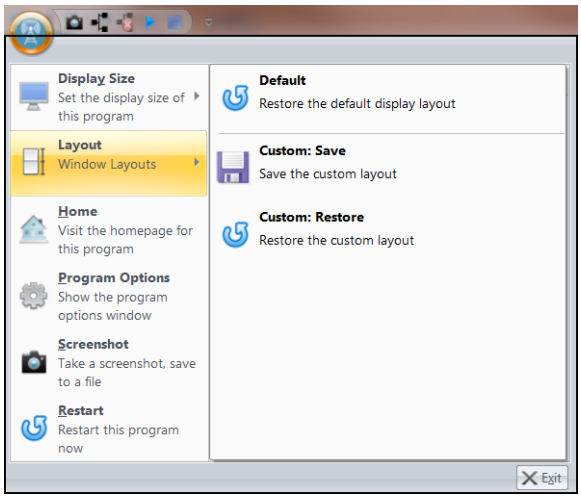
10.2 Clear

To clear (erase) a memory definition select *Clear* from the dropdown menu displayed when you click the dropdown arrow.

10.3 Apply

To apply a memory either click the Memory icon (a yellow folder with a star) or select *Apply* from the dropdown menu displayed when you click the dropdown arrow.

11 Layout



Click the round ribbon bar button located in the top-left of the display to select Layout options.

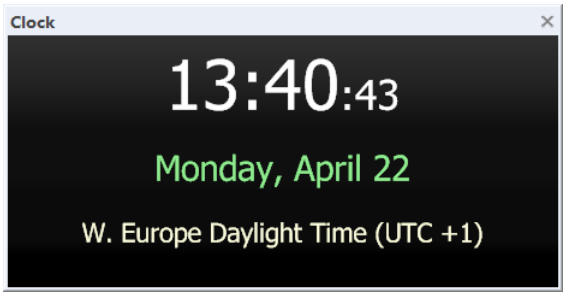
The available options are:

- Default - restores the default display layout.
- Custom Save - saves the current layout.
- Custom Restore - restores the custom layout.

12 Extras

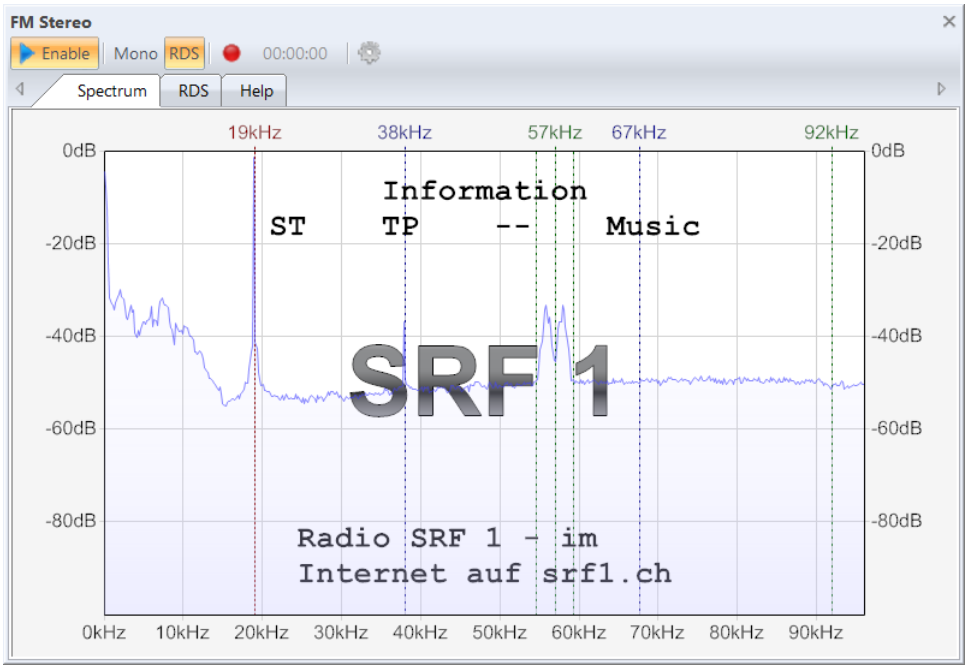
A brief description of features of this software which don't belong anywhere else.

12.1 Clock

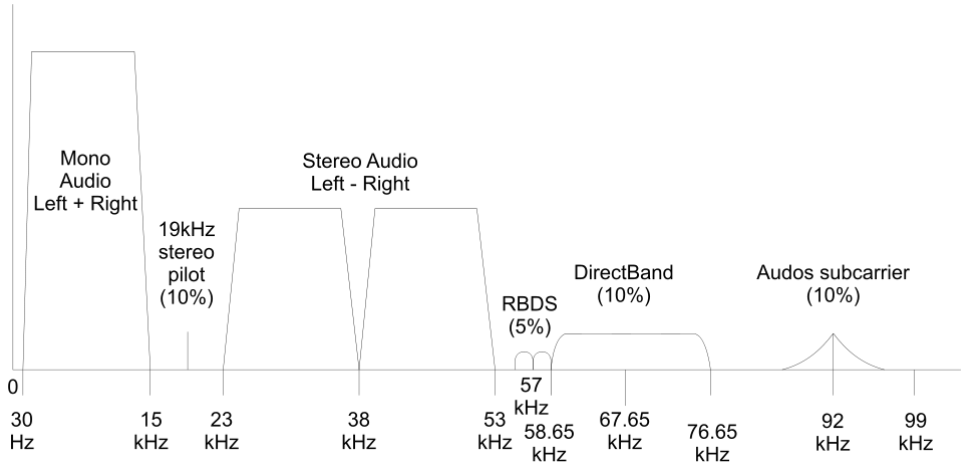


Current time, date and zone. Selected from the *Display* pane of the ribbon bar.

12.2 FM Stereo

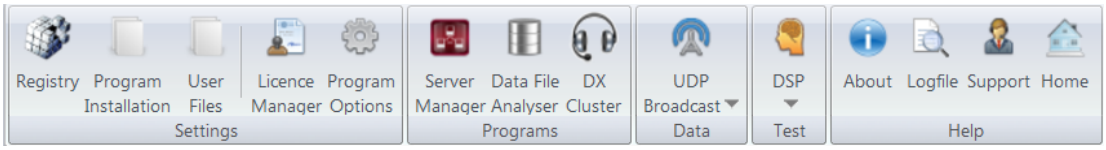


When demodulating broadcast FM you can use the FM Stereo window to display the demodulated spectrum along with RDS information. For a good description of the FM Stereo signal see http://en.wikipedia.org/wiki/FM_broadcasting .


Mono
Audio
Left + Right
19kHz
stereo
pilot
(10%)
Stereo Audio
Left - Right
RBDS
(5%)
DirectBand
(10%)
Audos subcarrier
(10%)
0
30
Hz
15
kHz
23
kHz
38
kHz
53
kHz
57
kHz
58.65
kHz
67.65
kHz
76.65
kHz
92
kHz
99
kHz

13 Tools

The *Tools* pane of the ribbon bar contains support options and additional SDR programs.



13.1 Support

The support options are:

- Registry – displays the registry editor opened at the folder where this program's settings are stored.
- Program Installation – browse the files in the installation folder with Windows Explorer.
- User Files – browse the settings files created by this program which are stored in you private folders.
- Program Options – see page 41.

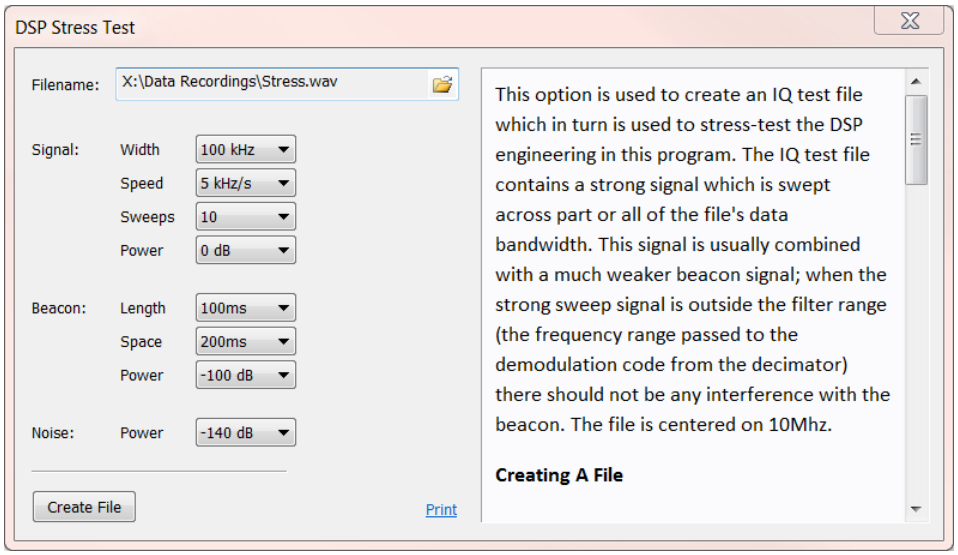
13.2 Programs

The programs which can be started are:

- Licence Manager – starts the licence manager which you use to diagnose licence problems and load new licences.
- Server Manager – for configuring the optional remote server.
- Data File Analyser – for analyzing data file recordings.
- DX Cluster – for radio amateurs only, this is a website showing the most interesting stations which are currently active.

13.3 DSP

13.3.1 Stress Test



This option is used to create an IQ test file which in turn is used to stress-test the DSP engineering in this program. The IQ test file contains a strong signal which is swept across part or all of the file's data bandwidth. This signal is usually combined with a much weaker beacon signal; when the strong sweep signal is outside the filter range (the frequency range passed to the demodulation code from the decimator) there should not be any interference with the beacon. The file is centered on 10Mhz.

13.3.1.1 Creating A File

Sweep Signal

The bandwidth is selected to control the actual half-band and fractional decimation filters used to generate the signal which is passed to the DSP demodulation. A higher bandwidth requires more half-band filtering. If the half-band filters are not correctly designed then unwanted signals will be created.

- The sweep width is the bandwidth over which the signal is swept.
- The sweep speed is the rate of change in signal frequency.
- The sweep count is the number of complete sweeps in the file.
- The signal power is the maximum signal strength of the swept signal.

Beacon

The beacon is a weak signal (typically at least 120 dB lower in strength than the sweep signal) which is monitored while the file is being played.

Noise

Optionally add Gaussian noise to the signal to simulate real-world signals with noise.

13.3.1.2 Playing a File

When you play a file the aim is to be able to hear the beacon signal while the much stronger sweep signal is outside the frequency range passed to the demodulation code from the decimator.

- Select CW-U and open the filter to the maximum 4 kHz width to allow all demodulated signal through to the speakers.
- Display the Audio Spectrum window to see the beacon signal.
- Center the VFO on 10MHz.

14 Licence

The licence information is shown in the logfile. To display the logfile select *Logfile* from the *Display* pane of the ribbon bar.

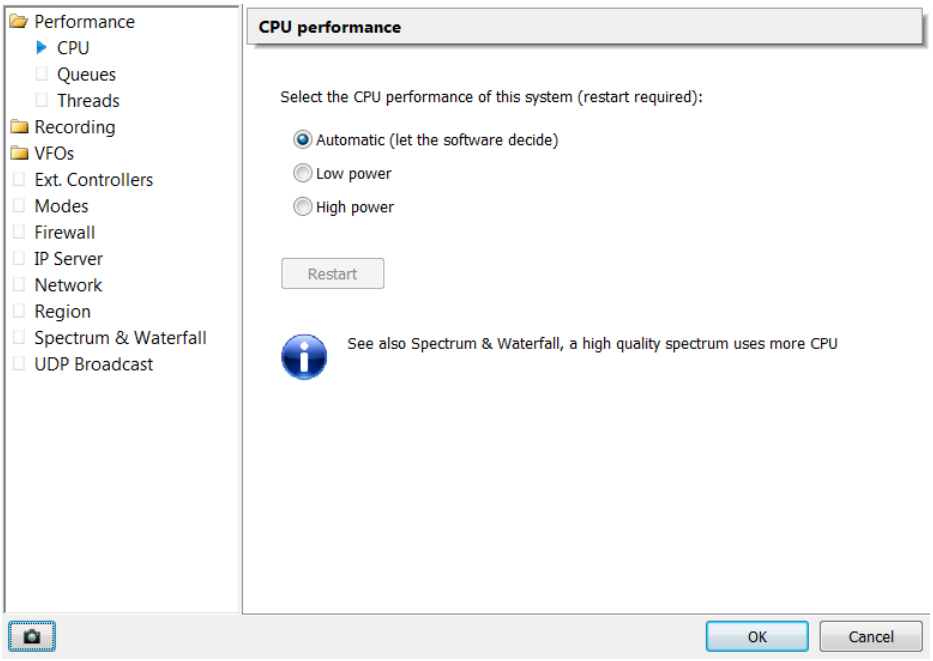
14.1 Sample

```
13:40:03> Licence
13:40:03>     Activation key ....: EHHX0-D0Y00-91EGD-P8A8R-4N2DZ-
MN477J
13:40:03>     Computer key ......:
13:40:03>     Computer name .....: STAR-TREK-ROCKS
13:40:03>     Current date ......: 04/22/13 13:40:03
13:40:03>     Status ............: Valid
13:40:03>     Valid .............: Yes
13:40:03>     Expiration ........: 09/30/13 00:00:00
13:40:03>     Duration (days) ...: 0
13:40:03>     Days left  ........: 162
13:40:03>     Needs activation ..: No
13:40:03>     Version ...........: 2.0 (2.0)
13:40:03>     -
13:40:03>     Activation key ....: E4KS0-D0Z00-51FJD-C8N8N-442I5-
RGCU3C
13:40:03>     Computer key ......:
13:40:03>     Computer name .....: STAR-TREK-ROCKS
13:40:03>     Current date ......: 04/22/13 13:40:03
13:40:03>     Status ............: Valid
13:40:03>     Valid .............: Yes
13:40:03>     Expiration ........: 05/31/13 00:00:00
13:40:03>     Duration (days) ...: 0
13:40:03>     Days left  ........: 40
13:40:03>     Needs activation ..: No
13:40:03>     Version ...........: 2.0 (2.0)
```

15 Program Options

15.1 Performance

15.1.1 CPU

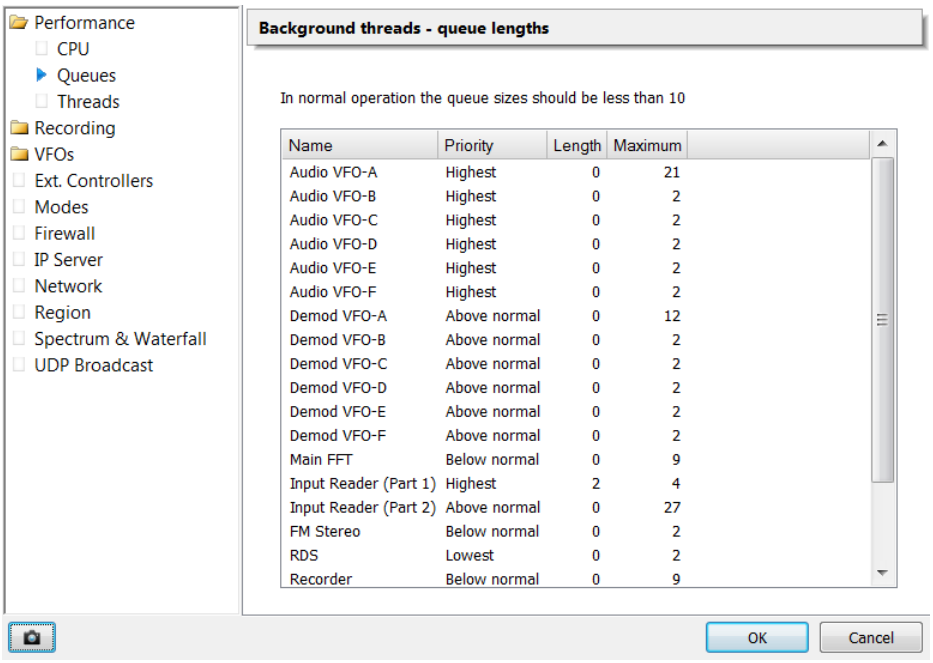


This software is designed to run on anything from a 1.6GHz ATOM processor to the latest i7. When a lower-powered system is used it is necessary to reduce the processing. Normally you let the software decide whether it is running on a low or high-power system; here you can override this setting.

The logic used to select high-power is:

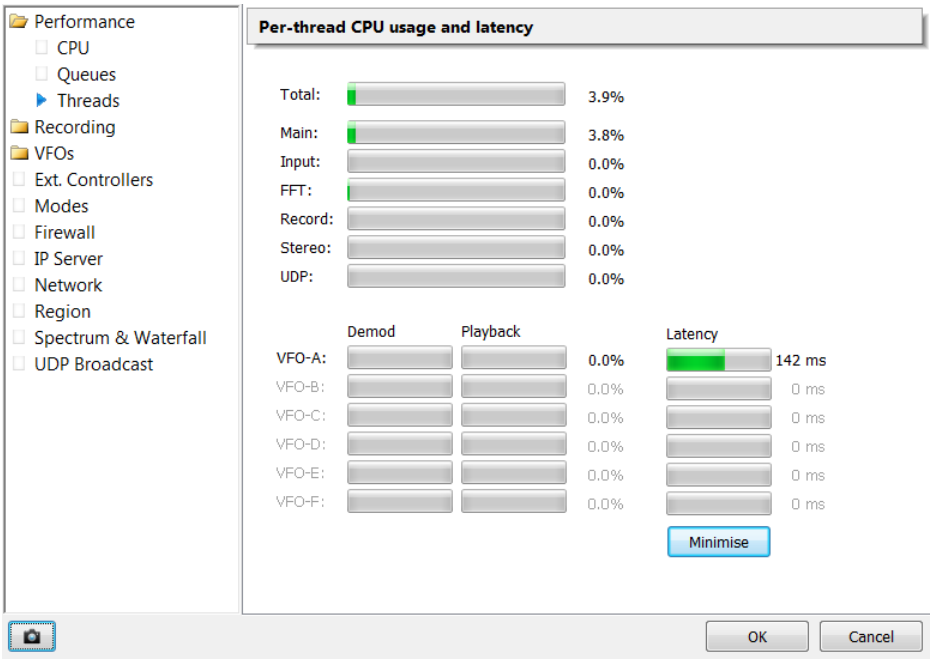
- Two or more cores
- SIMD extensions 4.1 or 4.2
- Clock frequency of 2GHz or higher

15.1.2 Queues



This diagnostic page shows the background thread unprocessed queue sizes (length). If the background threads are not running properly the queue sizes will increase.

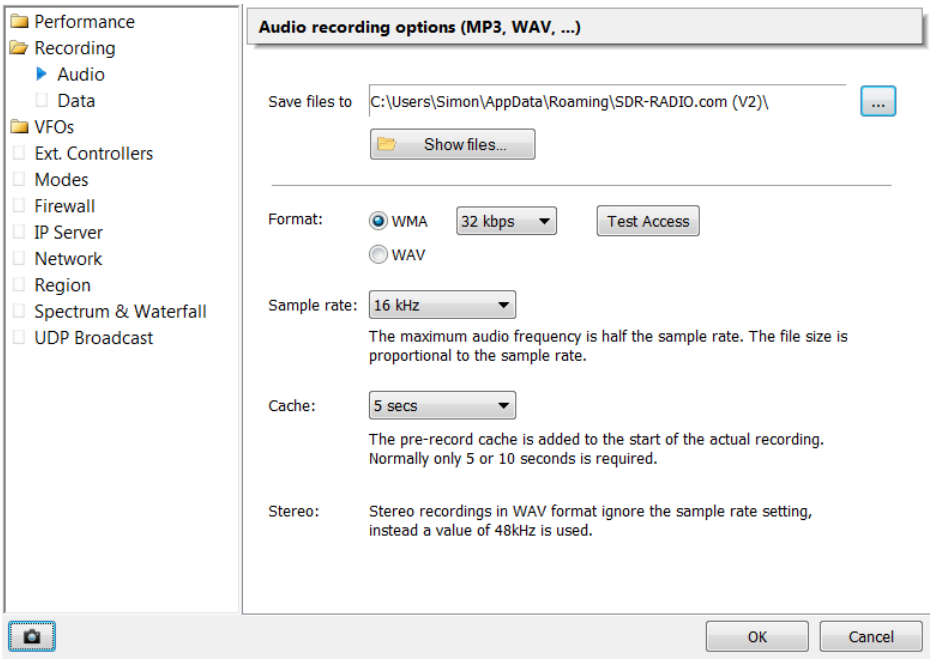
15.1.3 Threads



This diagnostic page shows the per-background thread usage and audio latency.

15.2 Recording

15.2.1 Audio



The page contains audio recording configuration. The software supports two formats:

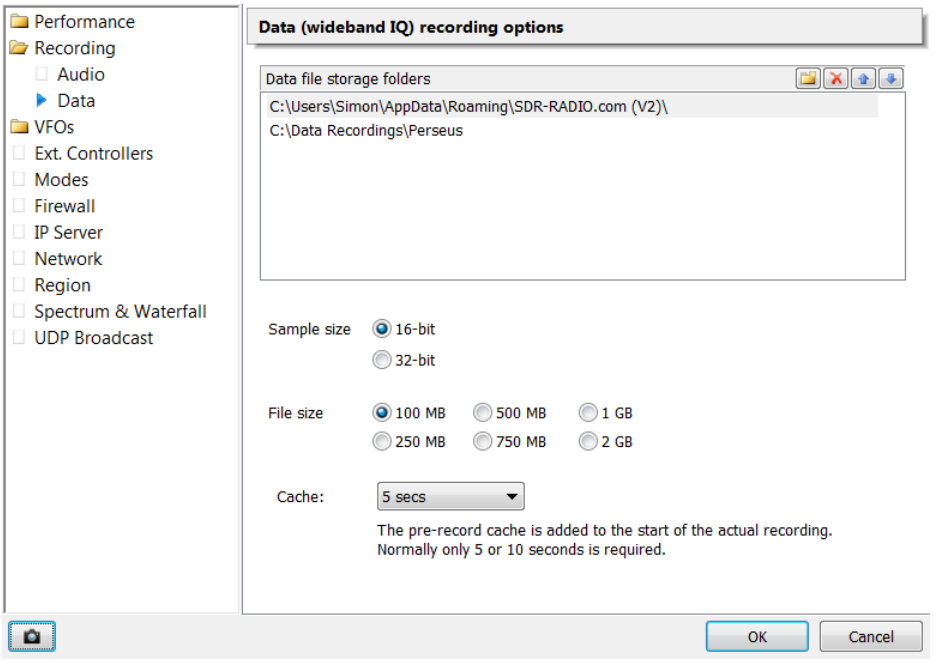
1. Windows Media Audio (WMA) is an audio data compression technology developed by Microsoft. This is used in the normal lossy format.
2. Waveform Audio File Format (WAVE, or more commonly known as WAV due to its filename extension), (also, but rarely, named, Audio for Windows) is a Microsoft and IBM audio file format standard for storing an audio bitstream on PCs. This is a lossless format.

WMA uses less storage (disk space) than WAV and supports tags which are displayed when the file is played in Windows Media Player. When using WMA select the output rate; a higher rate has better quality at the cost of more storage.

WAV: The maximum audio frequency is half the sample rate, the file size is proportional to the sample rate. Stereo recordings ignore the sample rate and use 48kHz instead.

Cache: a pre-record cache is added to the start of the actual recording. Normally only 5 or 10 seconds is required.

15.2.2 Data



Data recordings contain the raw IQ data read from the SDR radio, this can be played back for later signal analysis.

Two sample rates are supported; 32-bit samples contain higher precision data but require twice as much storage.

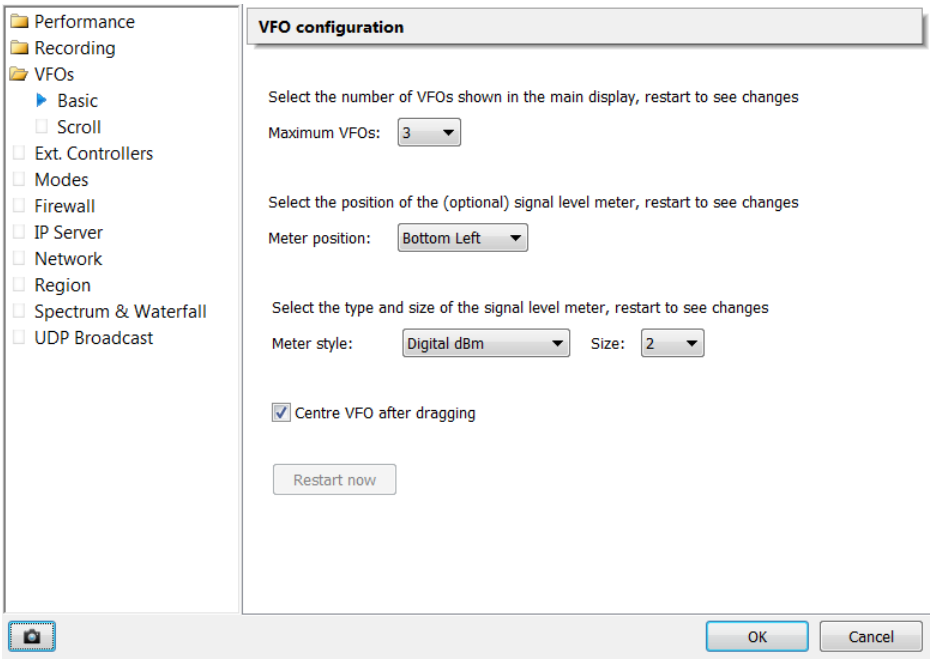
The data is stored in a series of files, select the individual file size.

The pre-record cache is added to the start of the recorded data. Normally only 5 or 10 seconds is required.

Data is stored using the Waveform Audio File Format (WAVE, or more commonly known as WAV), later VITA-49 will be used.

15.3 VFOs

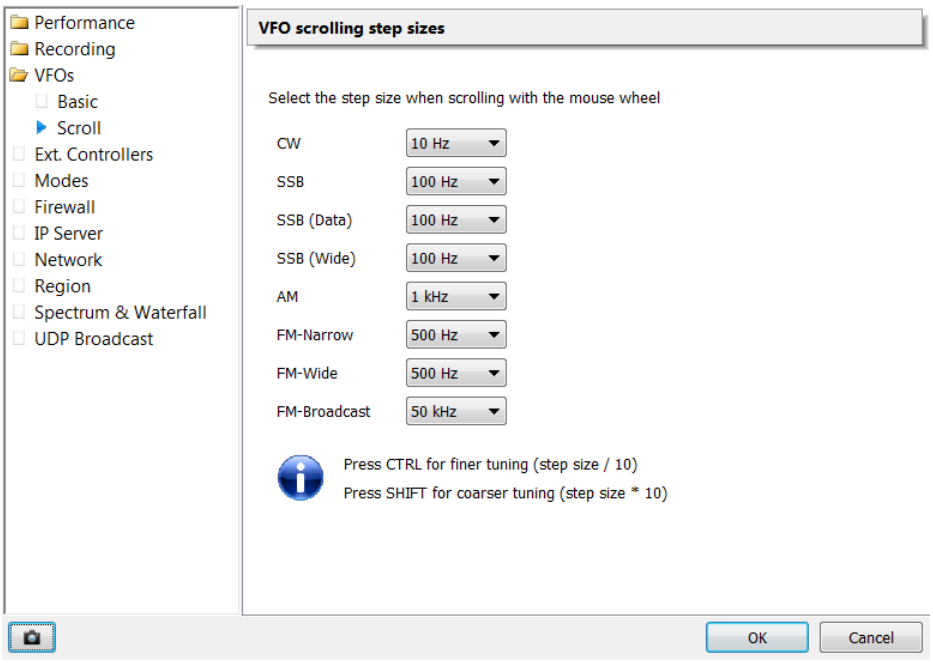
15.3.1 Basic



The page contains basic VFO configuration:

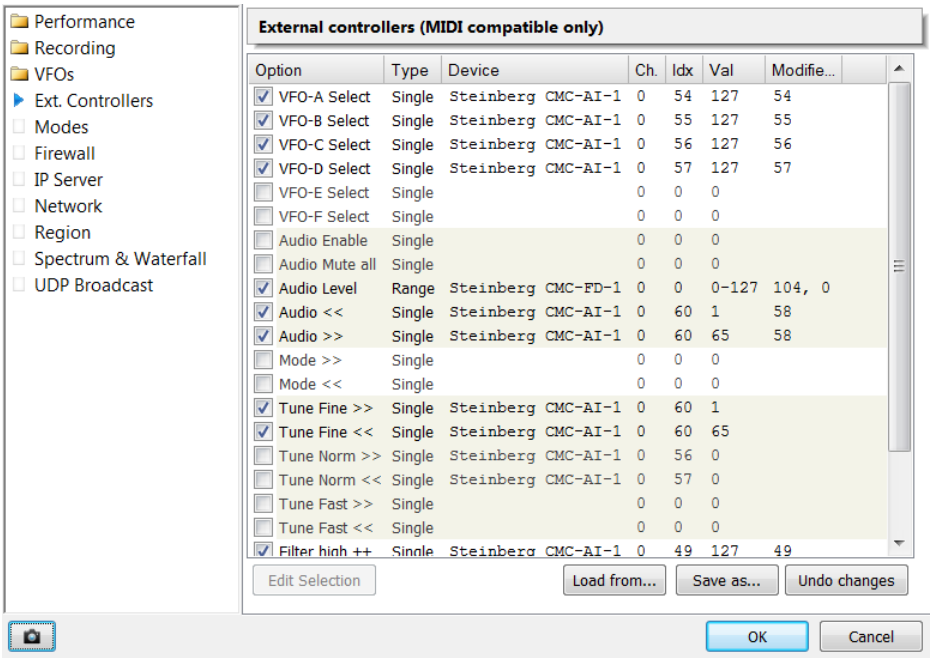
- The maximum number of VFO windows which are available,
- The position, type and size of the signal strength meter,
- Whether the VFO should be centered on the demodulation frequency after the user has dragged the frequency.

15.3.2 Scroll



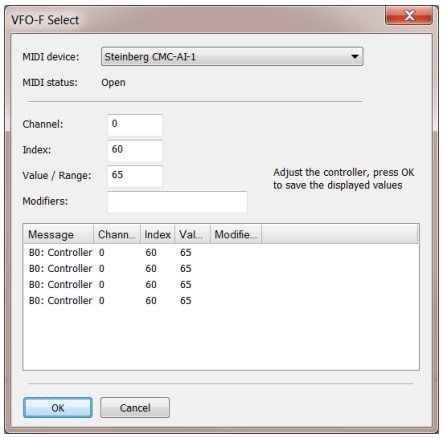
For each mode select the step size when scrolling with the mouse wheel. The same value is used when rounding the VFO frequency while dragging the frequency bar.

15.4 External Controllers



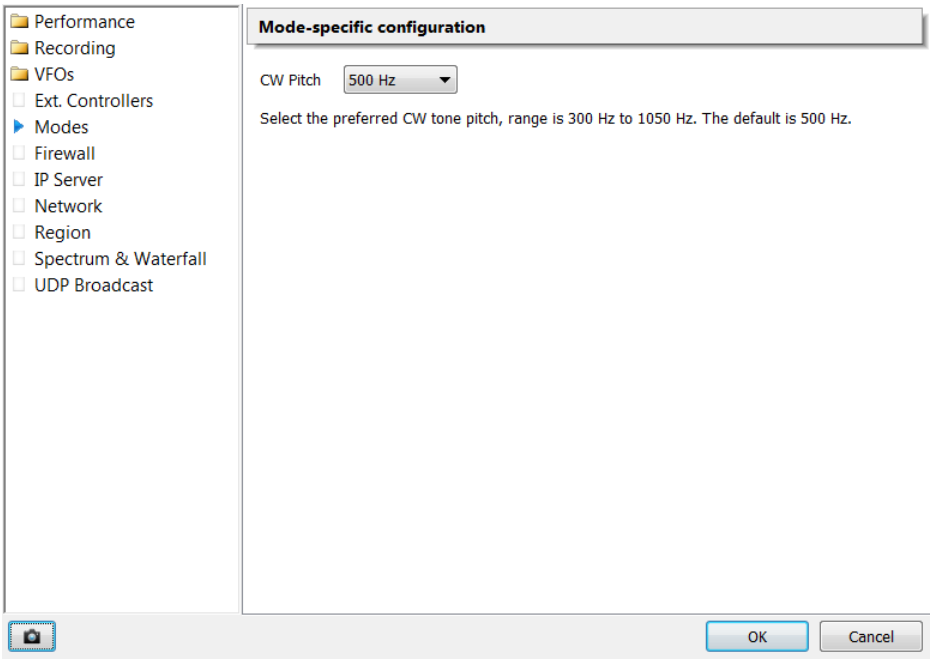
An SDR radio is a radio ‘with no knobs’, but that doesn’t stop you adding a MIDI device such as a Hercules DJ console or Steinberg MIDI controller.

To edit a definition double-click on the entry, the editor window is displayed.



Select the MIDI device from the dropdown at the top, press or adjust the correspoding button / slider / wheel and press OK to use the currently displayed values.

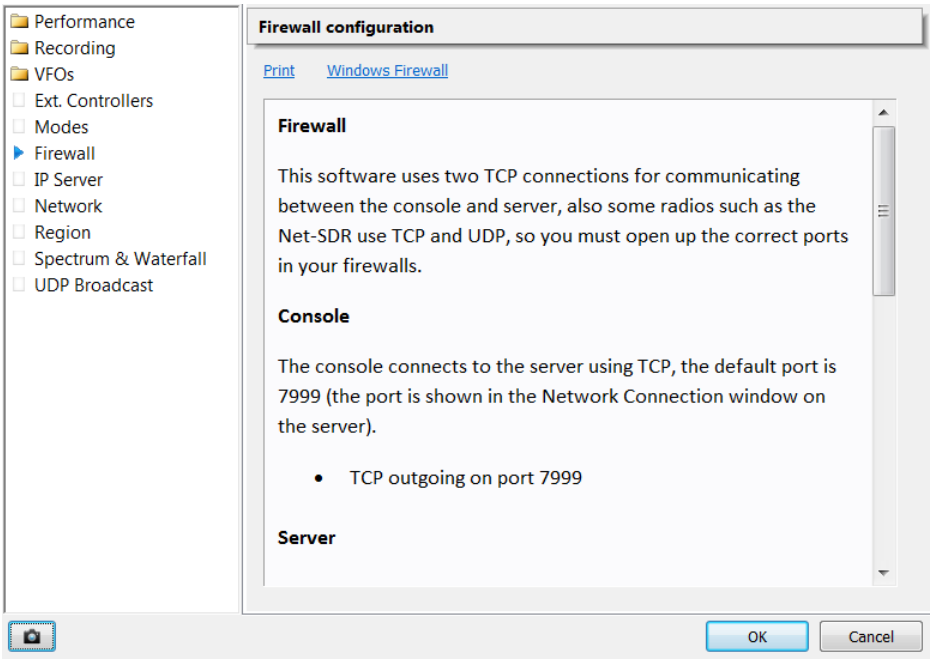
15.5 Modes



This page contains mode-specific settings.

The CW pitch is the frequency used when setting the VFO frequency – for example setting a VFO frequency of 7.050.000 with a CW pitch of 500 Hz results in a CW signal at 7.050.000 being heard at 500 Hz.

15.6 Firewall



This software uses two TCP connections for communicating between the console and server, also some radios such as the Net-SDR use TCP and UDP, so you must open up the correct ports in your firewalls.

15.6.1 Console

The console connects to the server using TCP, the default port is 7999 (the port is shown in the Network Connection window on the server).

- TCP outgoing on port 7999

15.6.2 Server

The server accepts TCP connections on port 7999 (as selected in the Network Connection window on the server).

- TCP incoming on port 7999

15.6.3 Radios

Ethernet-based radios use TCP and/or UDP so you must know which ports are being used.

15.6.3.1 RFspace

The RFspace Net-SDR and SDR-IP use the same port for incoming TCP connection and outgoing UDP packets, the default is 50,000. This port assignment is user-configurable.

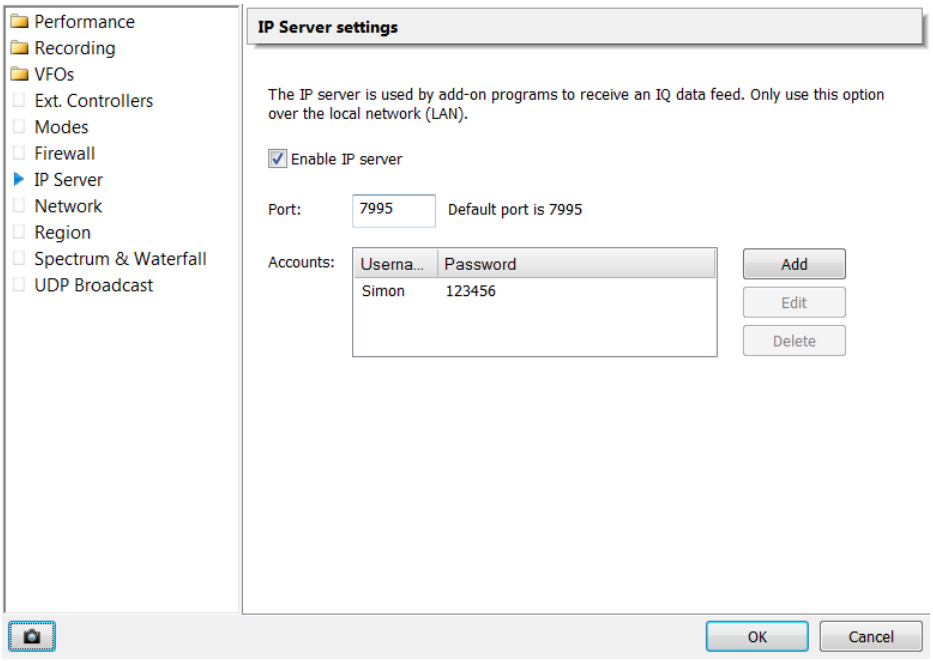
- TCP outgoing on port 50,000
- UDP incoming on port 50,000

15.6.3.2 Ettus Research

The Ettus radios use a default port of 49152 for UDP control and receiving UDP packets. This port assignment is user-configurable.

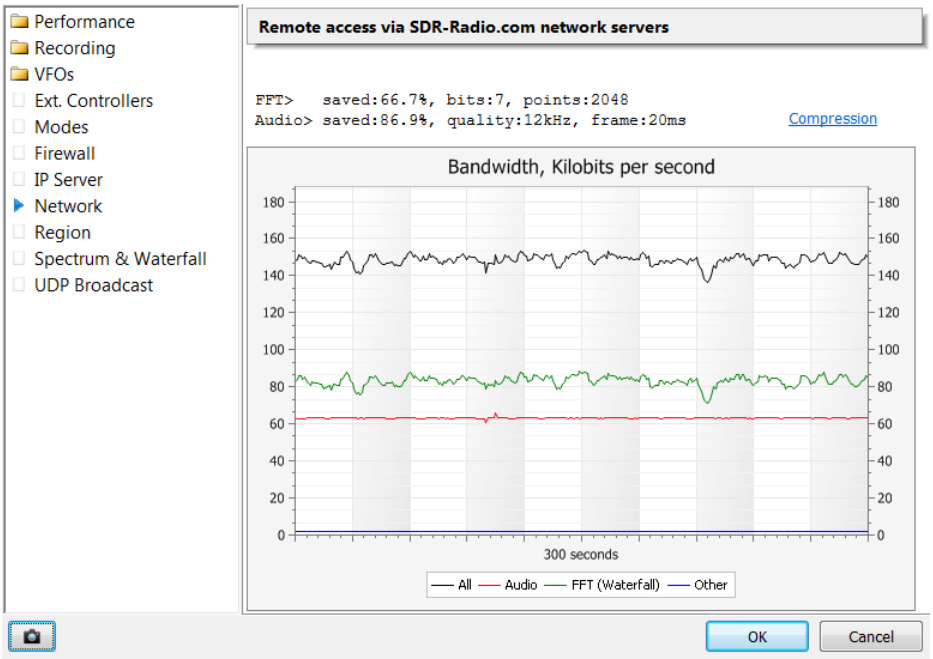
- UDP outgoing and incoming on port 49152.

15.7 IP Server



The IP Server provides support for add-on programs by sending an IQ data stream by sending data and control commands using TCP. The add-on programs connect to the console using the port and one of the accounts specified here.

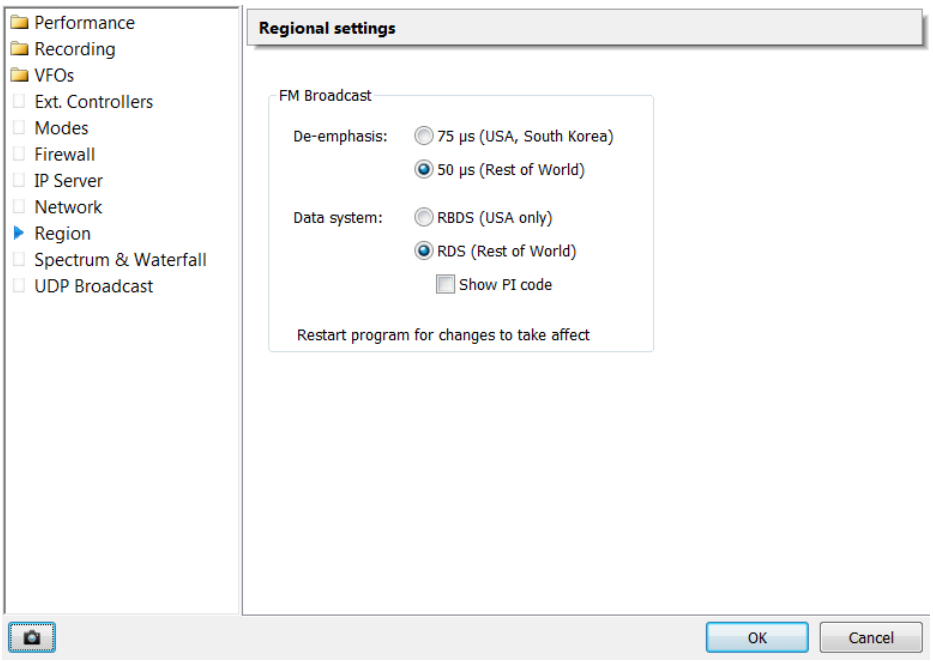
15.8 Network



Displays network throughput when connected to a remote server.

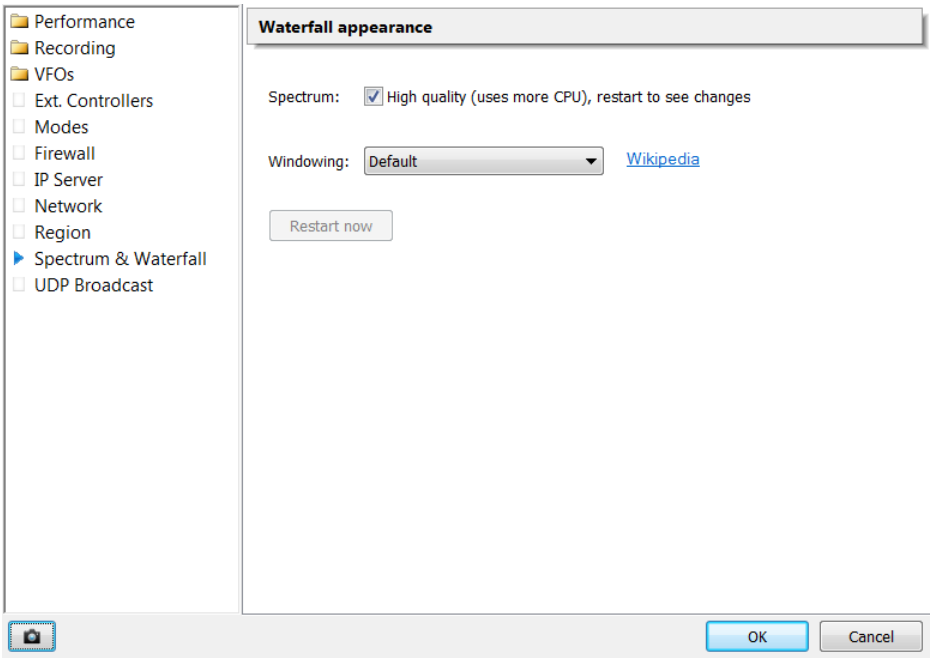
The bandwidth settings are defined on the remote server.

15.9 Region



This page defines settings for the FM broadcast demodulation. Just select the correct region (USA, rest of world).

15.10 Spectrum & Waterfall

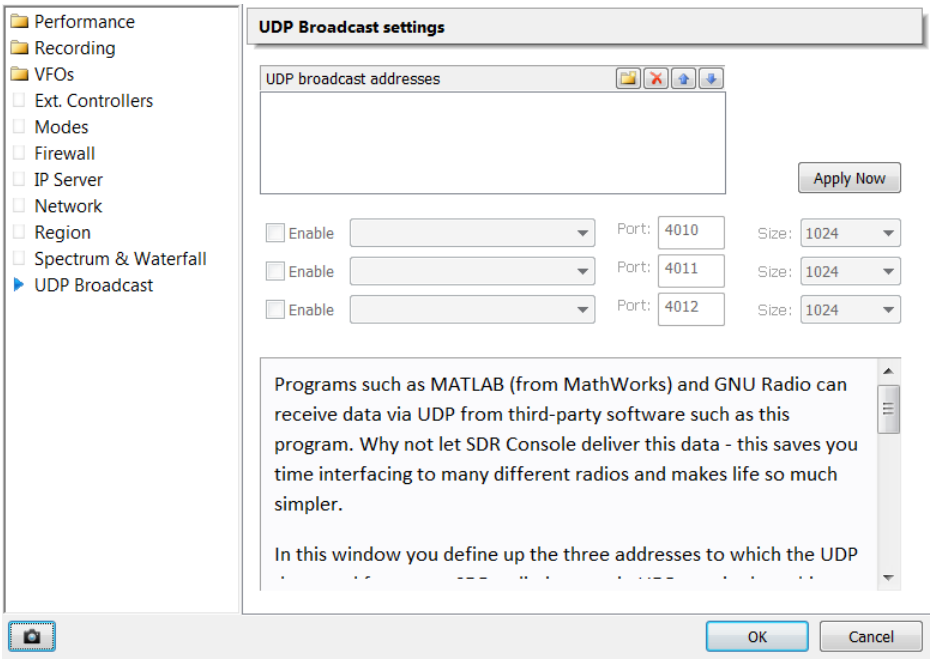


The spectrum scope can run one of two modes:

1. Low quality (default),
2. High quality (uses more CPU).

The waterfall displays FFT data, when the FFT is generated a windowing function is applied to the data to enhance the display, select the windowing function that produces the best results for your system.

15.11 UDP Broadcast



Programs such as MATLAB (from MathWorks) and GNU Radio can receive data via UDP from third-party software such as this program. Why not let SDR Console deliver this data - this saves you time interfacing to many different radios and makes life so much simpler.

In this window you define up the three addresses to which the UDP data read from your SDR radio is sent - in UDP terminology this data is broadcast. For each definition you also select the packet size; bigger is more efficient but you must take Maximum Transmission Unit (MTU) size in any routers into account. Each packet contains multiple IQ samples; each sample is 16 bits, so the size of each IQ sample is 2 * 2 = 4 bytes.

If UDP Broadcast is currently enabled you can update the current settings by pressing Apply now.

The frequency span is the same as the frequency span returned from the radio; this is shown in the status bar. The network bandwidth will be 4 x this span as the samples are 16-bit

signed integer, in addition there will be UDP packet overhead which will depend on whether you are using IPv4 or IPv6.

This only works with local radio connections, not in network mode.

16 Troubleshooting

Here are suggested solutions to common problems you may encounter.

16.1 Firewalls

Firewall

This software uses two TCP connections for communicating between the console and server, also some radios such as the Net-SDR use TCP and UDP, so you must open up the correct ports in your firewalls.

Console

The console connects to the server using TCP, the default port is 7999 (the port is shown in the Network Connection window on the server).

- TCP outgoing on port 7999

Server

The server accepts TCP connections on port 7999 (as selected in the Network page).

- TCP incoming on port 7999

Radios

Ethernet-based radios use TCP and/or UDP so you must know which ports are being used.

RFspace

The RFspace Net-SDR and SDR-IP use the same port for incoming TCP connection and outgoing UDP packets, the default is 50,000. This port assignment is user-configurable.

- TCP outgoing on port 50,000
- UDP incoming on port 50,000

Ettus Research

The Ettus radios use a default port of 49152 for UDP control and receiving UDP packets. This port assignment is user-configurable.

- UDP outgoing and incoming on port 49152.

16.2 VFO - No Audio or Data

If a VFO does not display data and does not generate audio, make sure:

- The VFO is enabled,
- The VFO frequency is within the current frequency range of the radio,
- The correct soundcard is selected,
- The audio is not muted,
- The audio level is not turned down.

Index