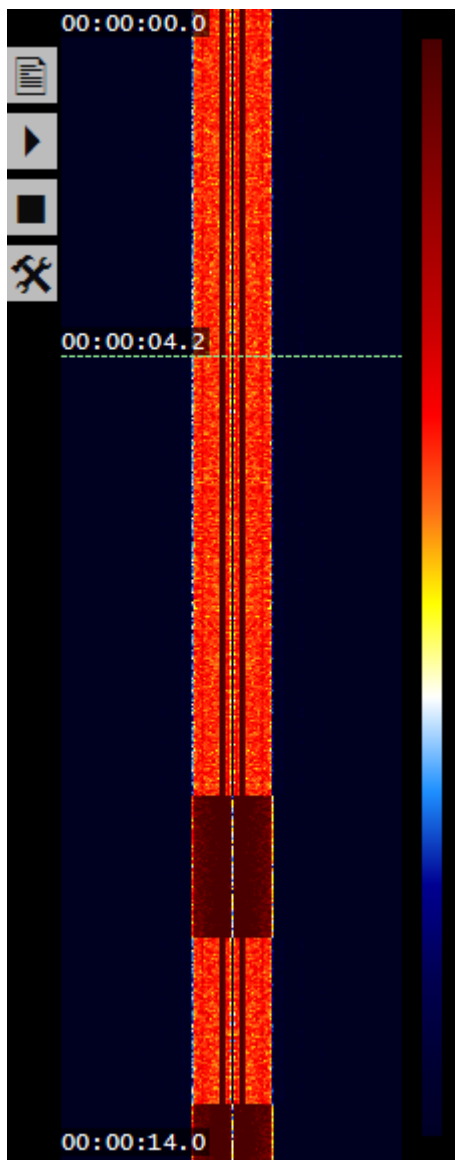


# File Player (WAV Player) – A SDR# front-end plug-in

original by Vasili (TSSDR) – Modified/Updated plug-in and documentation by [thewraith2008](#) – March 2022



SDR# panel

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## **Description**

The *File Player (WAVPlayer)* front-end plug-in allows the use of recorded IQ data files to be used as an input source to SDR#.

This plug-in can only be used with SDR# versions up to v1777 as later versions don't allow external front-ends any-more. These later versions have an older version of the front-end built in.

Various IQ data files from different [SDR# plug-ins and programs supported](#)

- So long as the IQ data (wFormatTag) is PCM or IEEE Float @ 2 channels it should work.
- See [below](#) for more details about supported files.

When a valid IQ file is loaded in, a waterfall is displayed to represent the duration of the IQ file. This waterfall allows loading of new files, playback (play/pause/stop and timeline start) and access to additional options and information.

Playback:

- Shows a marker at approximate time position on playback.
- Some current file details are available via tool-tip.
- Can loop playback.
- Can show timeline as 00:00:00 to xx:xx:xx.
- Can show timeline as real-time (using start time of recording) .
- Can optionally select frequency via waterfall.
- Can zoom in on a selection of the file

## **Features**

- Display file as waterfall
- Playback of IQ files greater than 2 Gb possible.
- File extensions: WAV, RF64, BW64, (DSD+ FMPx) IQ and RAW supported (see [here](#)).
- Show details about file (File format, Sample format, Samplerate).
- Loop playback.
- Optionally show timeline timestamps as real-time.
- Zoom in on a selection on the file.

This plug-in can only be used with SDR# versions up to v1777 as later versions don't allow external front-ends any-more. These later versions have an older version of the front-end built in.

## **Installation**

This plug-in should work with SDR# 1700-1716

- Maybe some versions earlier (<1699) or later (v1717-1777) but these are not tested.
- This plug-in won't work from versions v1777+ as later versions don't allow external front-ends any-more. These later versions have an older version of the front-end built in.

### **SDR# 1700-1716**

Copy the following file to your SDR# folder:

- ***SDRSharp.WAVPlayer.dll***

There is no need to edit '***FrontEnds.xml***' or '***Plugins.xml***' files.

This plug-in can only be used with SDR# versions up to v1777 as later versions don't allow external front-ends any-more. These later versions have an older version of the front-end built in.

## **Usage**

Click SDR# 'cogwheel' or click 'page' button in waterfall to load a suitable IQ file.

- See [here](#) for supported files.
- If the file is a .RAW or some .IQ types, a pop-up window will displayed and it is required for user to know correct file format values for the file otherwise poor quality playback will result.

Configure SDR# demodulator and filter options as needed.

Click SDR# play or the waterfall play button on waterfall.

### **Additional usage information:**

On first start, a pop-up "*Empty path name is not legal*" is shown.

This just means a file has not been selected yet

- The waterfall will not be shown until a suitable file is selected.

If the previous selected file no longer exists at SDR# start-up, a pop-up will be shown indicating this

- The waterfall will not be shown until a suitable file is selected.

Depending on file type selected (.RAW or .IQ with no header) you maybe presented with a "RAW data format" window

- (.RAW) This file format information needs to be known by user for correct playback.
- (.IQ) files with no header and if you know which FMP variant created the file you can click a pre-set to fill the fields for you. (this does not guarantee correct playback)

The some addition plug-in settings can be changed via the button on waterfall (hammer crossed with wrench) icon. See [here](#).

Zoom: Left click hold and drag release a selection to zoom in on it and loop playback.

- This looping always occurs regardless of the 'Loop' option.

## **Waterfall controls (plug-in)**

### **Load file ('page' icon)**

Loads a new file

See [below](#) for more details about which files.

NOTE: After a file is loaded, the tool-tip for this icon will show filename, File format, Sample format and SampleRate (SR).

NOTE: Loading large files can take some time as it calculates waterfall image.

NOTE: A warning will show before re-loading large files. (when > 1Gb)

- If you select 'No' to loading the file, then the waterfall will be cleared and will be set to no file loaded condition.

NOTE: Loading a new file can also be done via the SDR# 'cogwheel'.

### **Play/Pause (icon)**

Start or pause playback

NOTE: On SDR# versions before v1700

- If SDR# is started with a WAV file that no longer exists or it is not the right WAV format, the waterfall play button will not work after a valid file is loaded and it requires that the SDR# play button to be used first to re-enable the waterfall play button.
- This is a result of been a front-end plug-in, if a file is not loaded at SDR# start, it will result in SDR# not been able to play as the *AudioSampleRate* will be 0. (which is not valid) (re)Loading a valid file will not fix this, only the described action above.

NOTE: Can use mouse to select a starting position anywhere on the timeline.

### **Stop (icon)**

Stop playback

This will reset playback marker to start

### **Options ('hammer and wench' icon)**

Opens window with additional plug-in options ([see below](#))

## **Options window controls**

### **Loop (check-box)**

When enabled will cause continuous (looping) playback.

### **Show real time (check-box)**

When enabled, it will show the timeline timestamp in real time (start from when file was recorded)  
Else the timestamp will be 00:00:00 to xx:xx:xx.

### **Enable frequency control (check-box)**

Allow selection of a frequency via waterfall panel

### **Hide frequency control (check-box)**

Disables the mouse marker and frequency box when the *Enable frequency control* option is enabled.

### **FFT resolution (number-box)**

For quality of waterfall rendering [512 – 65535]  
A higher will mean slow loading times.

### **Contrast (number-box)**

For waterfall rendering [-24 – 24]

### **Position [of waterfall panel](drop-box)**

Position waterfall either left or right of SDR# frequency spectrum.

## **RAW data format window controls**

### **Center frequency\* (number-box) – Only for RAW files**

Manually set the center frequency of IQ data

- This makes the frequency selection on spectrum correct.
- This value will only be used for .RAW files if the frequency value cannot be found in the filename.

### **Tuned frequency (number-box) – Only for DSD+ FMPx IQ files (without header)**

Manually set the tuned frequency of IQ data

- This makes the frequency selection on spectrum correct.
- The frequency to add here should be what the tuned frequency was when the file was recorded by FMPx. The plug-in will add an offset to this frequency to use as the center frequency which is used to make sure frequencies appear where expected.
- See [here](#) for more details about DSD+ FMPx offset.

### **Sample Rate SPS (number-box)**

Samplerate to use with the loaded file for correct playback.

### **Bits per sample (drop-box)**

Number of bits per sample to use with the loaded file for correct playback.

### **Channels (drop-box)**

Number of channels use with the loaded file for correct playback.

When 1 channel is selected, the defined samplerate will be divided by 2 by the plug-in.

- The plug-in will still process file as if it is 2 channels as I and Q interleaved data is expected.

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### **DSD RAW IQ pre-sets (buttons)**

If you know what DSD+ FMPx program created the IQ file, then use one of the pre-set buttons to quickly set the values.

- Buttons: FMP 1.0, FMP 2.0, FMP 2.4, FMPA 2.5, FMPA 10, FMPP 3.0  
The value on buttons = Msps
- Sets: Samplerate, bits per sample, number of channels and tuned frequency offset.
- Need to press one of the buttons to enable OK button.
- Correct values need to select for correct playback.

## Notes, bugs, limits or other things of possible interest

### NOTE:

**Not all aspects of this plug-in, whether it be it's usage, features, options, bugs, issues, problems or any other unforeseeable things maybe covered by this documentation.**

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### Supported WAV files

- All IQ data in follow files is expected to be PCM or IEEE Float @ 2 channels.  
The data in these files must be I and Q interleaved to work correctly.  
The bits per sample can be PCM: 8, 16, 24 and 32 bits or IEEE(float) 32 bits.  
Any files with a header will load automatically if valid.  
Any files without a header will need some values to be manually set.
- .WAV - Has header which can be RIFF, RF64 or BW64 structured <sup>\*5</sup>
- .RF64 - Has header and only differs from .WAV(RF64) by extension <sup>\*5</sup>
- .BW64 - Has header and only differs from .WAV(BW64) by extension <sup>\*1, 2 and 5</sup>
- .IQ - Only has header if created with DSD+ FMP24
- .IQ - No header if created with DSD+ (FMP, FMPP) and will be like .RAW <sup>\*3, 4 and 6</sup>
- .RAW - No header <sup>\*3</sup>

NOTE: If any of the supported file extensions are wrongly named, if they contain a header that is valid and have the expected data format, then file will be processed using that header.

NOTE: Files which expect a header may throw an error if the header is not present

- .WAV, .RF64, .BW64 and some .IQ created by FMP24

<sup>\*1</sup> The BW64 is same structure as RF64 except it does not use the 'ds64' chunk 'sampleCount'.

<sup>\*2</sup> The BW64 is not expected to be seen as no program known creates them yet but is supported anyway.

<sup>\*3</sup> The .RAW and some .IQ files when loaded, will see a pop-up window with values to set

- User is expected to know the samplerate, ~~number channels (expected to be 2)~~ and sample format (bits per sample)
- Correct values are required for correct playback.

<sup>\*4</sup> The .IQ files are expected to be created by DSD+ (FMP, FMP24[has header], FMPP)

- If not, then data must still comply with WAVE data requirements stated above.
- Non DSD+ .IQ files will be limited to only use the pre-set buttons.

<sup>\*5</sup> WAVE IQ data files with 1 channel (using header)

- Data in these files still must be I and Q interleaved data.
- The defined Samplerate (in header) is expected to be double the actual samplerate value.  
The plug-in will divide by 2 the defined Samplerate value.
- The defined BlockAlign (in header) is expected to be half the actual BlockAlign value.  
The plug-in will multiple by 2 the defined BlockAlign value.
- It's unknown if or what programs create files like this.

*Continued...*



<sup>\*6</sup> NOTE: Using DSD+ .IQ files that don't use a header

- The plug-in requires the correct centre frequency so frequencies are where you expect them to be in SDR#.
- Because these IQ files don't carry the frequency and because you are more than likely to know what the tuned frequency was when you recorded it, this tuned frequency is used with an offset to calculate the centre frequency which is used by the plug-in. This offset is worked out automatically on pre-set selection.
- These are the required offsets that the plug-in uses.

FMP	1.0 = -250 Khz
FMP	2.0 = -500 Khz
FMP	2.4 = -600 Khz
FMP24	2.4 = -600 Khz
FMPA	2.5 = -625 Khz
FMPA	10.0 = -2500 Khz **
FMPP	3.0 = -750 Khz

\*\* DSD+ FMPA v2.43 reports it can do this SampleRate but it doesn't work.

This offset is not confirmed but follows how the other offsets are worked out.

Playback of IQ files larger than 2 Gb is supported (via RF64/BW64 file format only)

- Some capture programs may have used the safe addressing (31 bits = 2 Gb max file size)
- Some capture programs may have used the full addressing (32 bits = 4 Gb max file size)
- RF64 format can be in .WAV or .RF64 files and the header will determine file format used.
- BW64 format can be in .WAV or .BW64 files and the header will determine file format used.
- NOTE: Standards say the RF64 header should not be used for WAV files under 4GB. The '*Baseband Recorder*' plug-in records files < 4 Gb with the RF64 header but it really doesn't hurt anything.

The IQ data files are normally created with: (not a complete list I'm sure)

- Recorder (Baseband) - Default SDR# plug-in
- Baseband Recorder - Created by Vasili (an updated version is also available from me)
- IF Recorder - Created by Vasili (an updated version is also available from me)
- DSD+ FMPx variant - Using 'R' to record which creates the .IQ extension file
- rtl-sdr.exe - Using .RAW extension  
e.g. command line: rtl\_sdr.exe -f 455000000 -g 25 -p -1 iqdatafile.raw  
Above records @ SR: 2.048 Msps - 8 bits - 2 channels
- Other ? - Playback will depend on header or knowing the file format values used and that IQ data must be PCM or IEEE Float @ 2 channels.

The plug-in attempts to read the filename to retrieve:

- Start timestamp and frequency (Hz, Khz, MHz).
- If the timestamp cannot be determined from filename, then the files last modified timestamp minus the duration will be used as real time start timestamp.
- If frequency cannot be determined from filename, then it will use samplerate divided by 2. For RAW files, the user set frequency may be used.

*Continued...*

Parsing the file header is limited to the first 10 Kb of the file

- This is to stop a malformed header and searching files for too long. (especially large files)
- It's possible that a valid file maybe be deemed unreadable and this would be because of a pile of unexpected crap in the beginning of the file before the expected 'data'.

SDR# Telerik theme matching is not required for this front-end.

This modified version and documentation by thewraith2008 started in July 2020 see ***Changelog.txt*** for more details about changes and fixes.

**Support forum here:**

<https://forums.radioreference.com/forums/software-defined-radio.193/>

Release thread here:

No specific thread created

NOTE: Support is not guaranteed. Especially if the answers are contained in the documentation or on forum.

Special thanks to the creators of the following software:

**SDRSharp (SDR#)** by Youssef Touil

- <https://airspy.com/>
- The File Player (WAVPlayer) plug-in utilises code from the SDR# plug-in API. As such, that code used by the plug-in is the property of Youssef Touil (Airspy).

**File Player (WAVPlayer)** (this original SDR# Plug-in) by Vasili (TSSDR)

- <http://rtl-sdr.ru>
- Thanks Vasili for allowing me to update this plug-in.

### **Necessary Disclaimer:**

- This program is "as is"
- This program most probably contains errors, bugs or whatever and that it may crash itself, SDR#, the plug-ins, windows or your car. You accept that you use it at your own risk.
- I make no promises to update it or support it.
- I'm under no obligation to implement anything.
- The creator of SDR# has the right to change their code as they see fit. Because of this, this program/plugin can and probably will break.
- Not reading the read-me/set-up and usage documentation files may cause you issues.