Tutorial: How to install, configure and use the TEF FM-DX Webserver with a SDR receiver on Windows

An important remark: First of all, it is important to remember that the TEF Webserver project was not initially created for the SDR receivers. The performance may be more limited by using a SDR receiver rather than a TEF: Unstable RDS decoding, lower selectivity, etc…

Anyway, creating a webserver with a SDR receiver has a real positive point: Clients are able to tune to your local FM band directly from their web browser, without using any additional software. They can also control it from their smartphones thanks to the mobile version.

This tutorial was made by Lucas Gallone in May 2024. Some indications and details may become erroneous with time.

We will learn how to get a SDR receiver (RTL-SDR, Airspy Mini, Airspy R2, Airspy HF+, Airspy HF+ Discovery) working with the FM-DX Webserver in a few steps… :)

Step 1: Download SDR#

In case you haven't already done so, you will have to download and install SDR#.
This software will allow you and the clients of your webserver to control your SDR receiver, so this is a very crucial element.

Download **the latest version** of SDR# for free on the official Airspy's website and follow the instructions for the configuration:
https://airspy.com/download/

Once the installation is done, **close SDR#**.

Step 2: Download the FM-DX Webserver

Just as for SDR#, if you haven't installed it yet, you will have to download the latest version of the FM-DX Webserver project made by « Noobish » on GitHub.

Follow the instructions on the GitHub page and click on the green « Code » button, then on « Download ZIP » in order to download all the required files for the installation. **Do not configure it yet** since there are particular steps to follow when using a SDR receiver.
The configuration process is discussed a bit further in this tutorial.

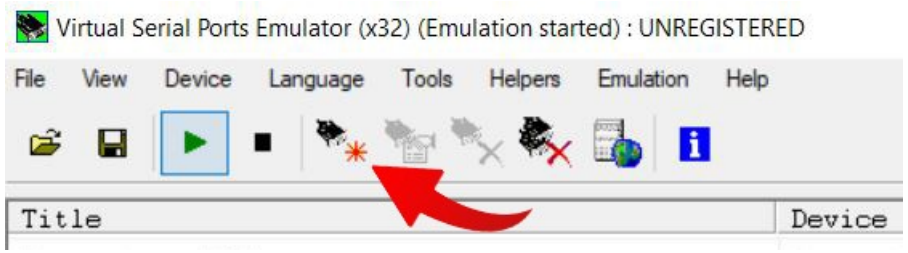
→ Link: https://github.com/NoobishSVK/fm-dx-webserver

Step 3: Install and configure VSPE

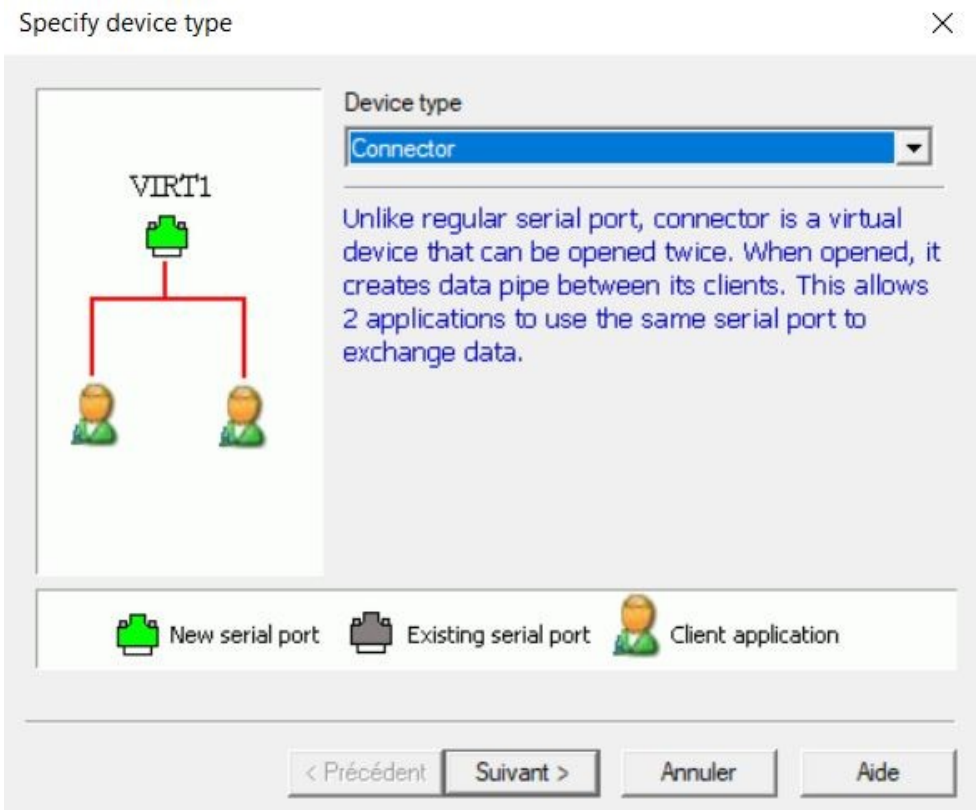
In order to establish a connection between SDR# and the webserver, we will have to emulate a COM Port.
VSPE (Virtual Serial Ports Emulator) is the perfect software to do so.

→ Download and install it from the official website by selecting the free-to-use 32 bit version (not the 64 bit one, even if you have a laptop): https://eterlogic.com/Products.VSPE.html

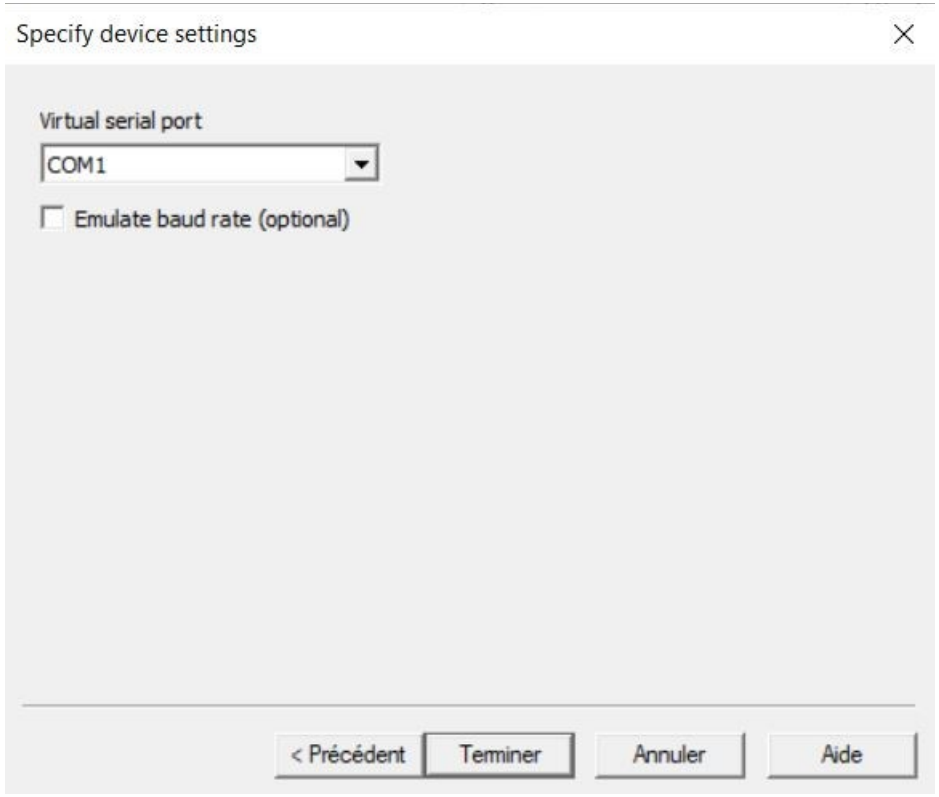
• Once you have installed it, open the port creator by clicking on the icon indicated on the screenshot below.



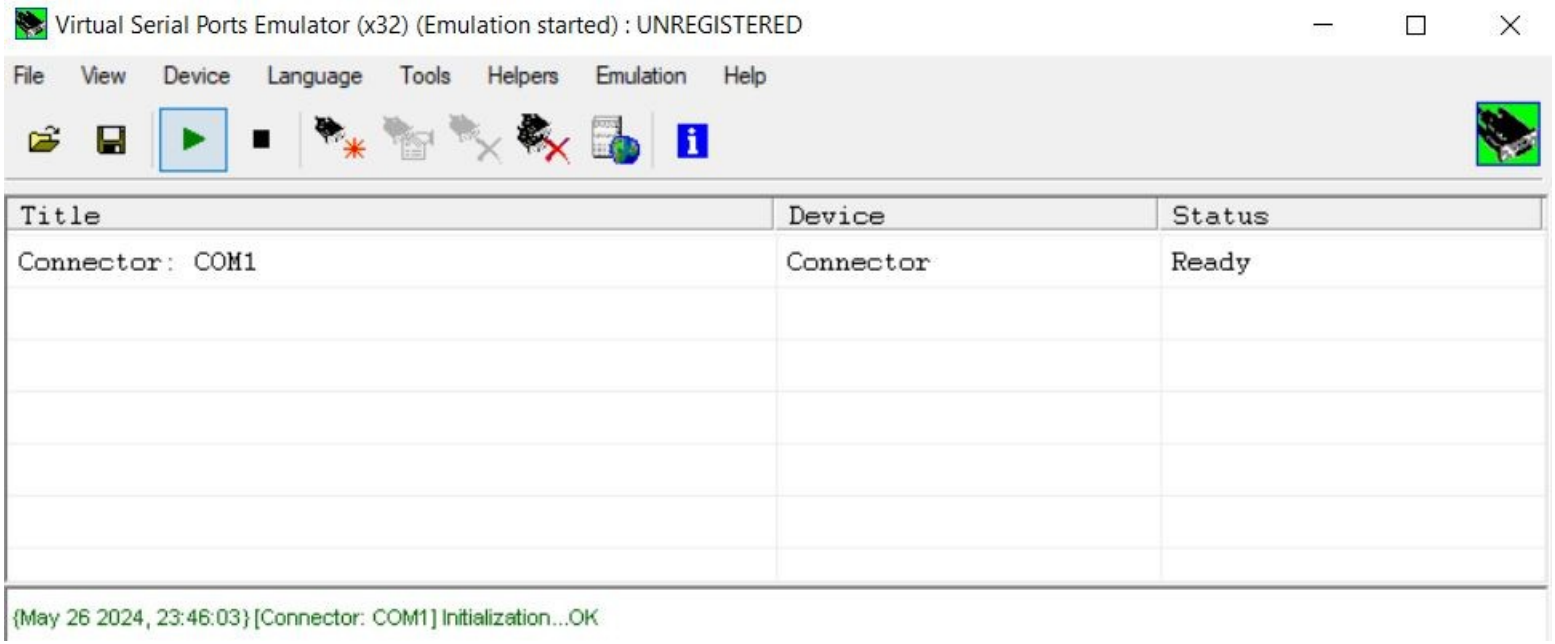
• A new window opens. Make sure you have selected « Connector » in the « Device type » section and click on « Next ».



• Then, this second window appears. Make sure that « COM1 » is selected as the « Virtual serial port » value and click on « Finish ».
Note: You can select another COM Port if you already use the COM1 for another purpose. In this case, take note of the value.
We will need it for a next step.



• Your virtual COM port is now configured and operational. VSPE should look like this if everything went well:

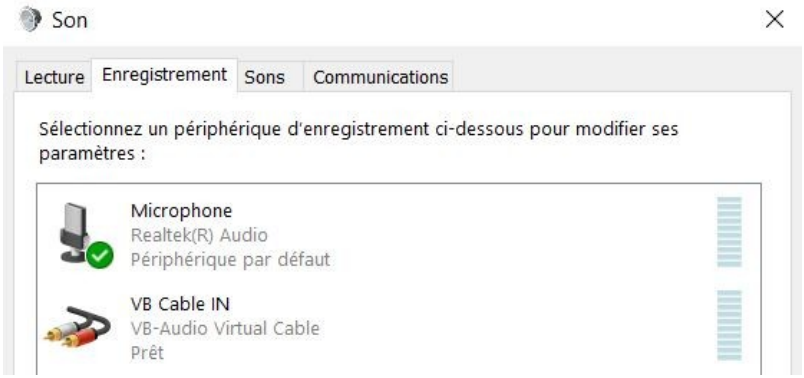


Step 4: Install VB CABLE (Virtual Audio Cable)

In order to allow your clients to get audio from your webserver, you will have to use a virtual audio cable.
For this tutorial, we will use VB CABLE which is the most famous software designed for this purpose.

→ Download it from the official website and follow the instructions of the setup wizard: https://vb-audio.com/Cable/

• Once the installation is done and after a reboot of your machine, check that your audio cable is correctly recognized by Windows.
• Go to the Audio settings in the Control Panel. Your virtual audio cable should appear in the « Playback » and « Recording » sections.

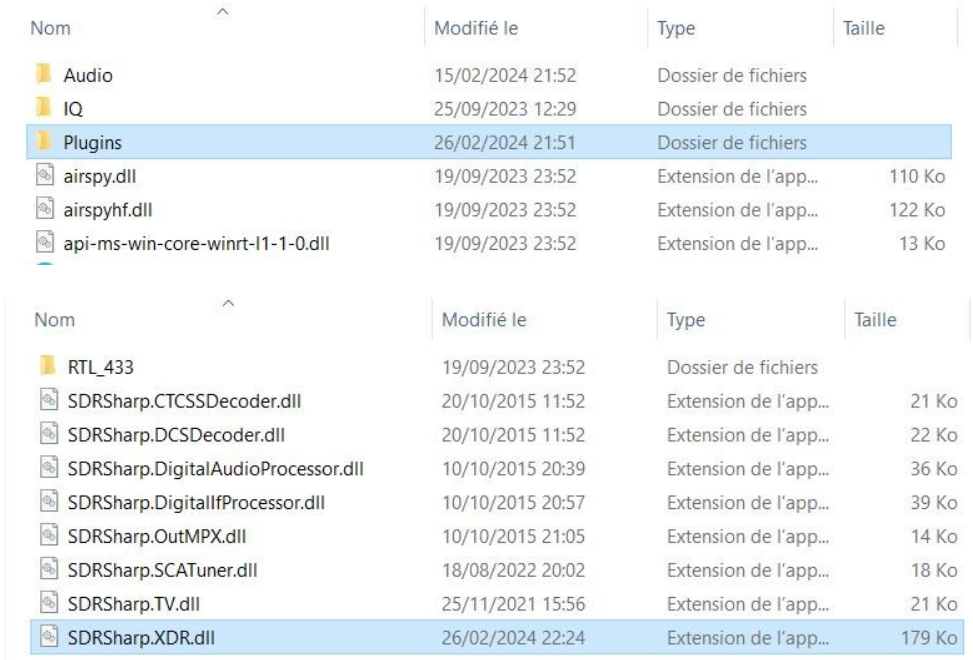


Step 5: Install the XDR-GTK plugin for SDR#

In order to be able to control the SDR receiver from the webserver, we need to use a SDR# plugin made by « veso266 ».

→ Download it from GitHub: https://github.com/veso266/SDRSharp.XDR/releases/download/1.0/SDRSharp.XDR.dll
→ More details about the plugin: https://github.com/veso266/SDRSharp.XDR

Make sure that SDR# is not running before doing this process!
• Once you have downloaded it, drop the « SDRSharp.XDR.dll » file to the « Plugins » subfolder inside the directory where SDR# is located.
You won't need to use the « Magicline » mentioned on GitHub with a recent version of SDR#, so you can ignore it.



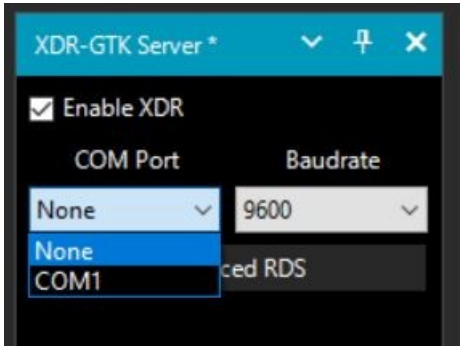
Nom	Modifié le	Type	Taille
Audio	15/02/2024 21:52	Dossier de fichiers	
IQ	25/09/2023 12:29	Dossier de fichiers	
Plugins	26/02/2024 21:51	Dossier de fichiers	
airspy.dll	19/09/2023 23:52	Extension de l'app...	110 Ko
airspyhf.dll	19/09/2023 23:52	Extension de l'app...	122 Ko
api-ms-win-core-winrt-l1-1-0.dll	19/09/2023 23:52	Extension de l'app...	13 Ko

Nom	Modifié le	Type	Taille
RTL_433	19/09/2023 23:52	Dossier de fichiers	
SDRSharp.CTCSSDecoder.dll	20/10/2015 11:52	Extension de l'app...	21 Ko
SDRSharp.DCSDecoder.dll	20/10/2015 11:52	Extension de l'app...	22 Ko
SDRSharp.DigitalAudioProcessor.dll	10/10/2015 20:39	Extension de l'app...	36 Ko
SDRSharp.DigitalIfProcessor.dll	10/10/2015 20:57	Extension de l'app...	39 Ko
SDRSharp.OutMPX.dll	10/10/2015 21:05	Extension de l'app...	14 Ko
SDRSharp.SCATuner.dll	18/08/2022 20:02	Extension de l'app...	18 Ko
SDRSharp.TV.dll	25/11/2021 15:56	Extension de l'app...	21 Ko
SDRSharp.XDR.dll	26/02/2024 22:24	Extension de l'app...	179 Ko

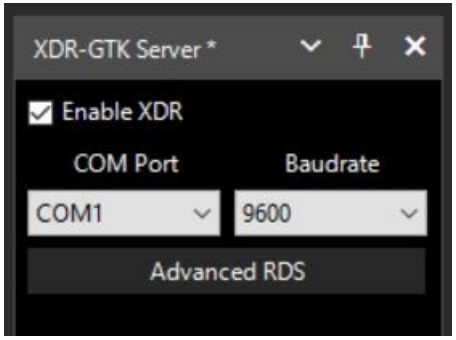
Step 6: Configure the XDR-GTK plugin

• **Open SDR# and VSPE again.** SDR# should now be able to recognize and list the plugin.
• Click on the « Main Menu » button at the top left of the SDR# window (Next to the Play button), then click on « XDR-GTK Server ».

You should be able to see the following panel:



• Click on the « Enable XDR » checkbox as on the screenshot above, then select « COM1 » in the « COM Port » section.
Make sure that the « Baudrate » value is set to « 9600 ».



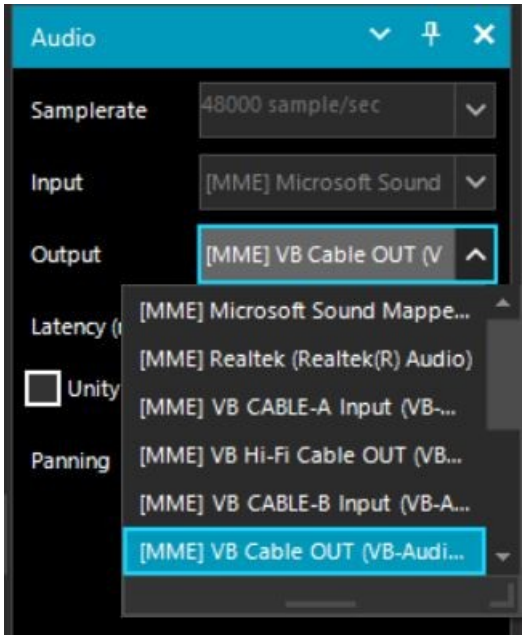
Step 7: Let's finish the configuration of SDR#

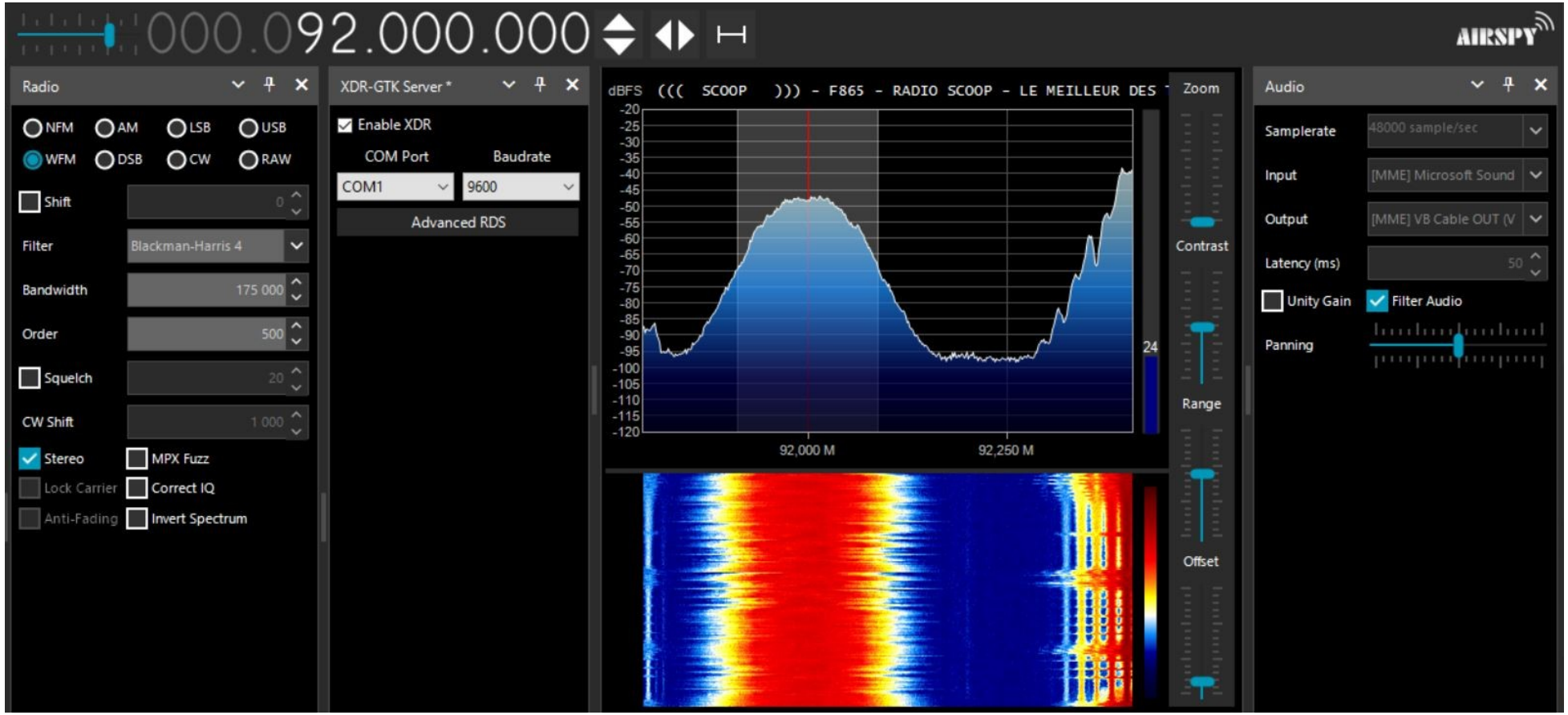
Ensure that your receiver is not running before doing this process!

• Click on the « Main Menu » button of SDR# (Next to the Play button) and then click on « Audio ».
• In the « Audio » section, select your virtual audio cable as the « Output » value.
The « Filter Audio » box should be checked, while the « Unity Gain » one should not be.

In the « Output » section, you should normally see two versions of your audio cable: One starting by « [MME] » and another starting by « [Windows DirectSound] ». In my case, the « [MME] » version works better, so I would suggest to use this one.
You don't need to pay attention to the « Input » value (Which is grayed out). It won't affect anything.

If you face issues with the MME version, select the Windows DirectSound one instead.

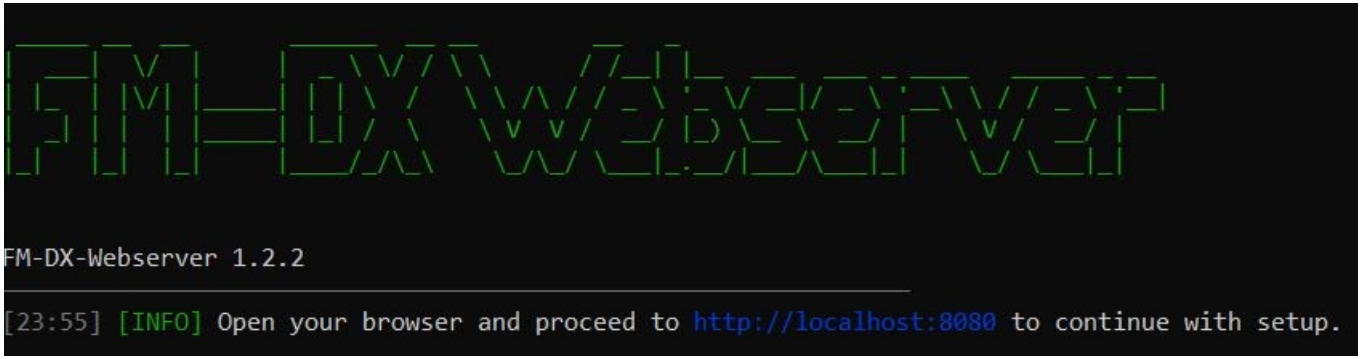


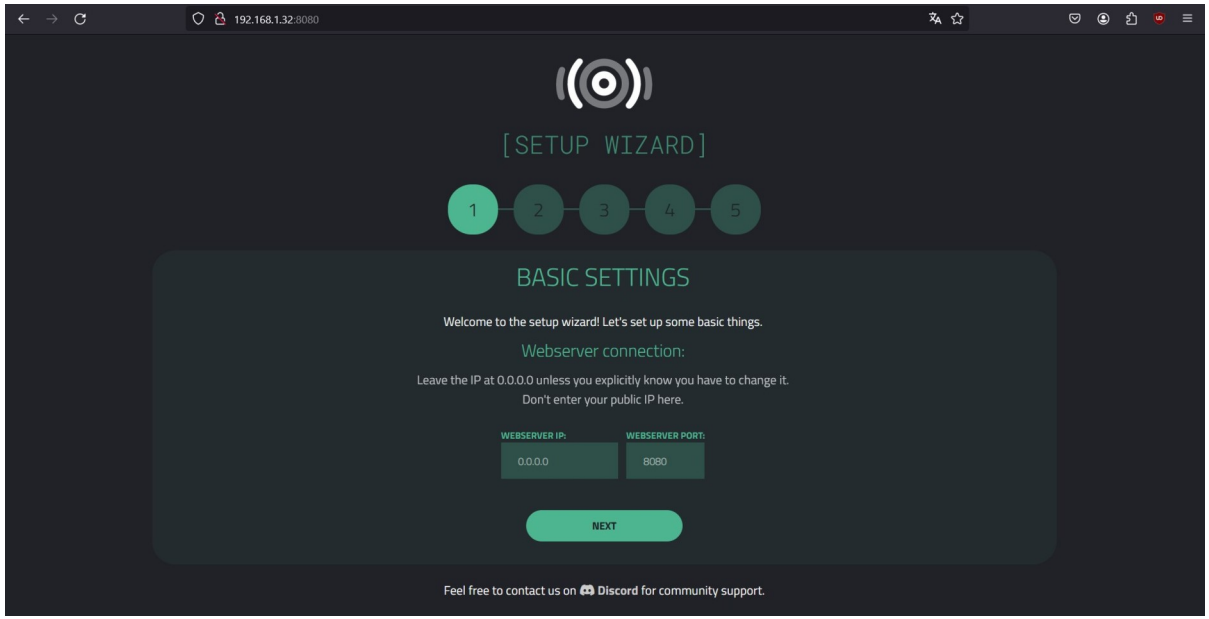


• Select your receiver model in the « Source » section of the Main Menu, if it hasn’t already been done.
• Start your receiver by clicking on the « Play » button.
• In the « Radio » section, select « WFM », set the Bandwidth value to « 175 000 » and check the « Stereo » box as on the screenshot above. Regarding the bandwidth value, you will be able to adjust it at any time from the webserver. (You have to enable the « Toggle Bandwidth Switch » option in the « Tuner Settings » section of your web admin interface)

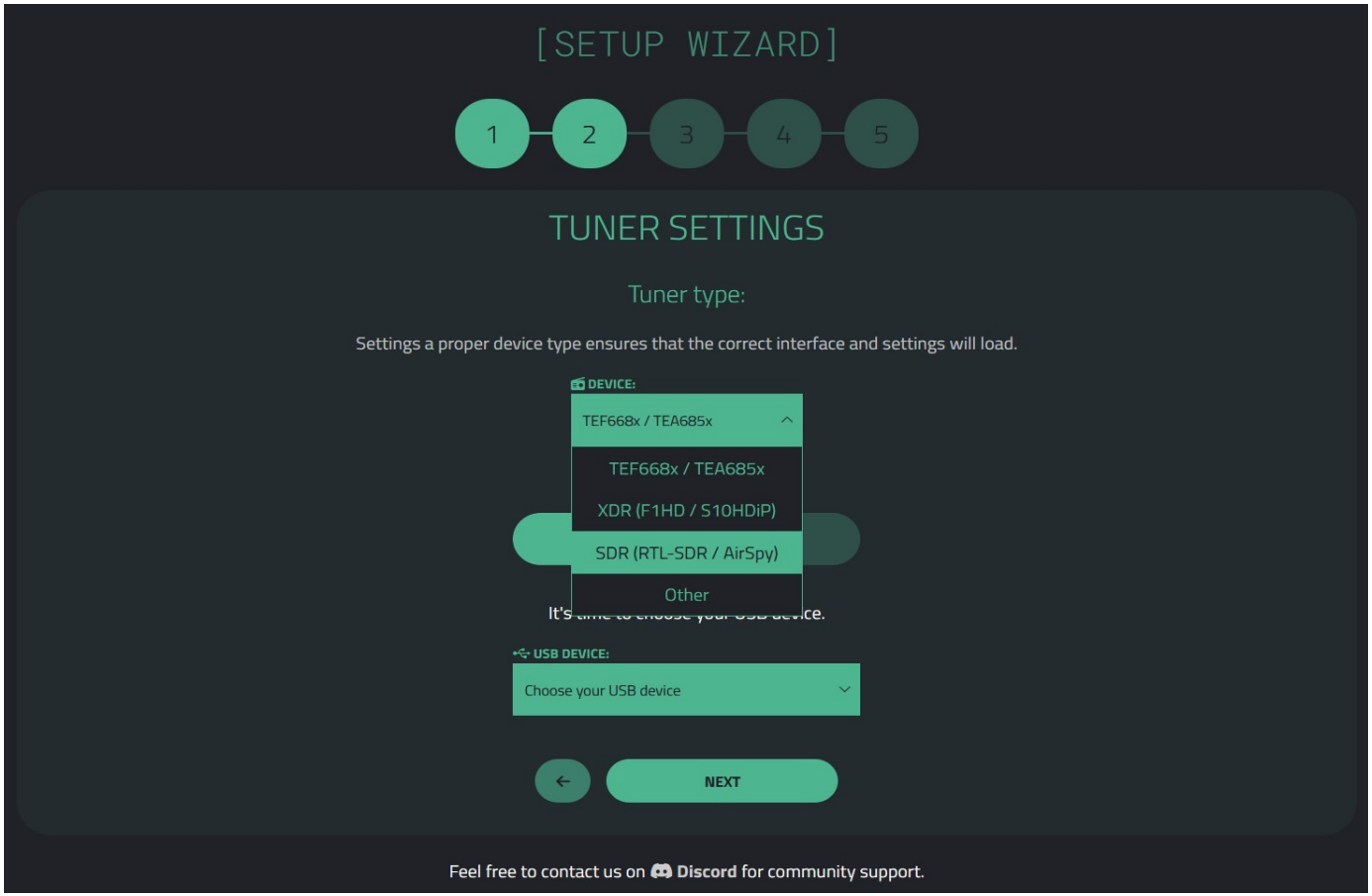
Step 8: Run the webserver and configure it

• Run the webserver (Downloaded earlier). A terminal should open and indicate the URL to put in your web browser in order to configure it.
Make sure to keep VSPE and SDR# running!
By default, the URL is → http://localhost:8080



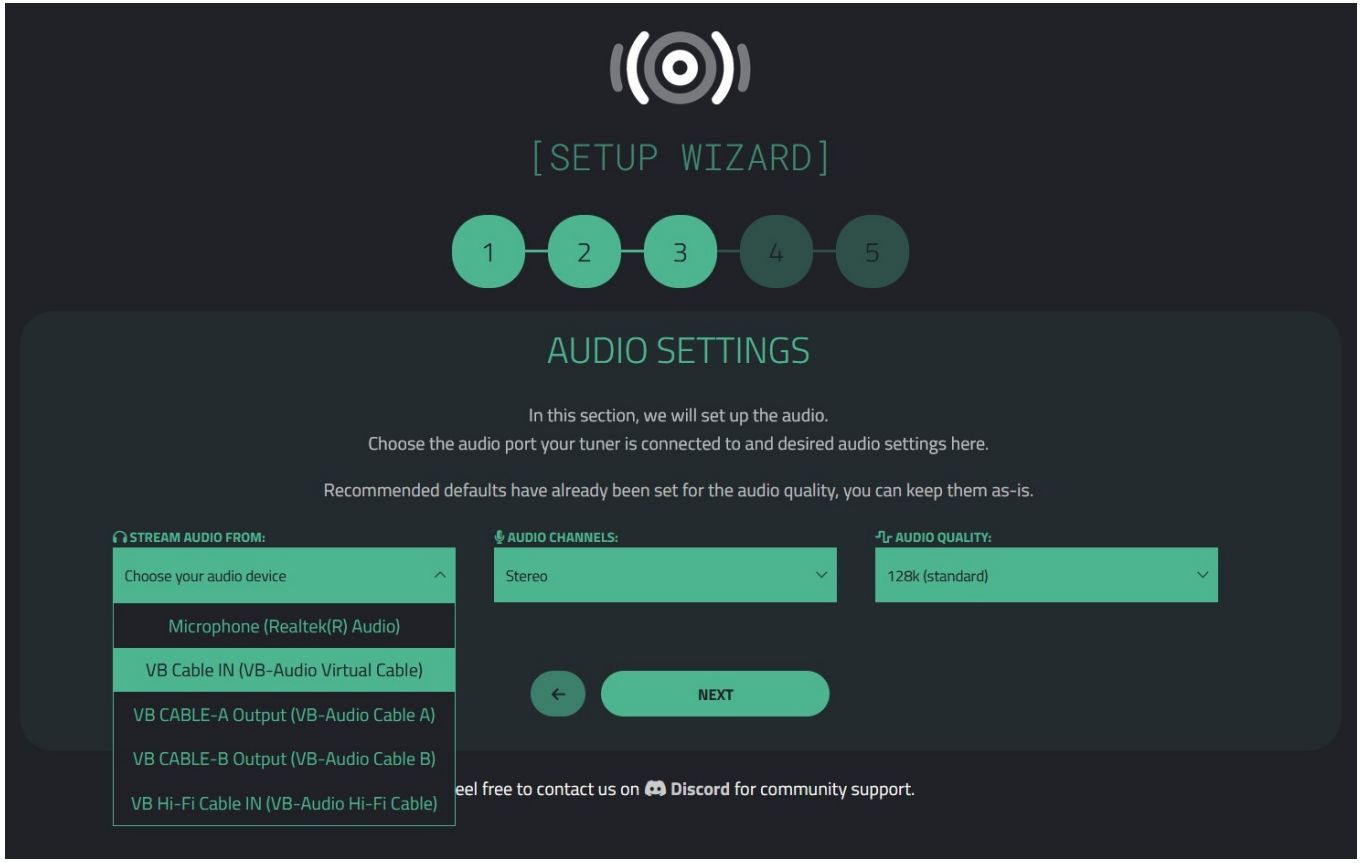


• When prompted, select the « SDR (RTL-SDR / AirSpy) » value in the « Device » section of the « Tuner settings » configuration page.



Clicking on « Choose your USB device » could lead to no result. If so, ignore this option and click on « Next », then follow the instructions indicated on the next pages.

• When prompted, select your virtual audio cable as the stream audio source on the « Audio Settings » page.



• Leave the « Stereo » value in the « Audio channels » section, and select the bitrate of your choice for your audio stream in the 3rd section. By default, the bitrate is set to 128 Kbps, but you can select a higher or lower value (Lower than 128 Kbps is not recommended, except if you have a [very] poor upload speed).

• **VERY IMPORTANT STEP:** When the setup wizard comes to its end, stop the webserver (by closing the terminal) and open the configuration file (config.json), located in the webserver folder, with a notepad software (Notepad++, the integrated notepad of Windows or any other software designed for this purpose).

If the « comPort » value in the configuration file is set to « tef », replace it with « COM1 » **(case sensitive!)** and save the edited version of config.json (Overwrite the file). **You will have to repeat this process EVERY TIME you make a modification in the settings of the server from the web admin interface.**

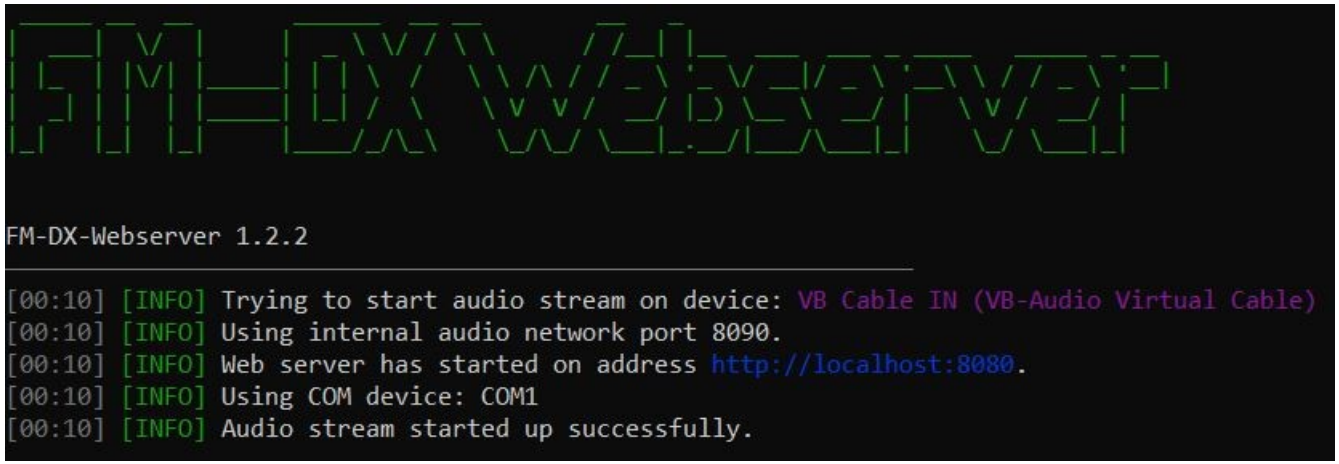
config.json

```
{
  "webserver": {
    "webserverIp": "0.0.0.0",
    "webserverPort": "8080",
    "banlist": [],
    "chatEnabled": true,
    "tuningLimit": false,
    "tuningLowerLimit": "0",
    "tuningUpperLimit": "108",
    "defaultTheme": "theme1",
    "presets": [
      "87.5",
      "87.5",
      "87.5",
      "87.5"
    ],
    "bgImage": "",
    "rdsMode": false
  },
  "xdrd": {
    "wirelessConnection": false,
    "comPort": "tef",
    "xdrdIp": "127.0.0.1",
    "xdrdPort": "7373",
    "xdrdPassword": "password"
```

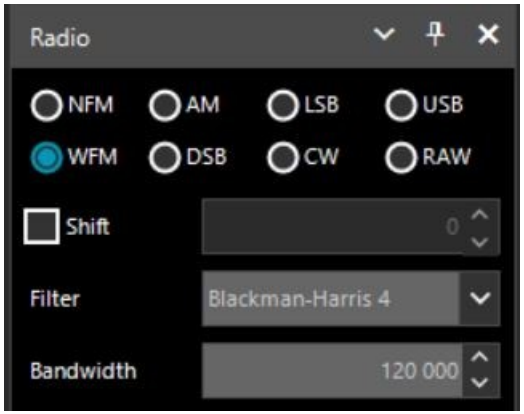
config.json

```
{
  "webserver": {
    "webserverIp": "0.0.0.0",
    "webserverPort": "8080",
    "banlist": [],
    "chatEnabled": true,
    "tuningLimit": false,
    "tuningLowerLimit": "0",
    "tuningUpperLimit": "108",
    "defaultTheme": "theme1",
    "presets": [
      "87.5",
      "87.5",
      "87.5",
      "87.5"
    ],
    "bgImage": "",
    "rdsMode": false
  },
  "xdrd": {
    "wirelessConnection": false,
    "comPort": "COM1",
    "xdrdIp": "127.0.0.1",
    "xdrdPort": "7373",
    "xdrdPassword": "password"
```

• Run the webserver again **by making sure that SDR# and VSPE are running**. The terminal should now indicate the settings you have set.



CAUTION: Every time you will start the FM-DX Webserver, the bandwidth value will be automatically set to 120 000.
You will have to change it every single time with 175 000 instead. Otherwise, the reception effect will be very poor, the audio will sound saturated and the RDS decoding will be wrong.



Also, you will have to respect this order each time you want to start the server:

1. Start VSPE (and make sure that the emulated COM port is ready)
2. Start SDR# and your receiver (by clicking on the Play button at the top left of the screen)
3. Start the FM-DX Webserver (Terminal)
4. Set the SDR# bandwidth value from 120 000 to 175 000 (For the reasons mentioned above)
→ You will have to be sure that VSPE and SDR# are constantly running on your machine with the server terminal open!

Note: When starting the webserver, SDR# automatically adjusts itself to 87.5 MHz. This is a normal behaviour.

Congratulations! Your SDR webserver should be running properly now! :)
If you have any issues or questions, don't hesitate to contact us on the OpenRadio Discord server.