

In this document, you will find how you can stream your local NOAA weather radio using a cheap NOAA radio, a Raspberry PI, and a USB sound card.

Others have done something similar using a USB radio tuner (RTL SDR) software defined radio. However, configuring those takes some skill and experience with SDR and Raspberry PIs.

While I am far from being a PI expert, I believe many average computer users can follow these steps and configure a PI for streaming.

This setup below can be done about the same cost as a SDR and is simpler to setup. It still utilizes a low power Raspberry PI to stream the audio. The other advantage is this method utilizes a cheap radio. During an emergency, you could take your stream offline and use this cheap radio for your own emergency purposes.

Once configured, you'll want to stream your broadcast to NOAAWeatherRadio.org . If you choose, you could also stream to Broadcastify. To use Broadcastify, you will need to create an account. They will respond with your MountPoint and password. Broadcastify accounts are free. NOAAWeatherRadio.org doesn't require an account and is also free.

Before beginning with NOAAWeatherRadio, you'll want to fill out this form:

<https://noaaweatherradio.org/addstream/addstream.html>

Also, read up on the HOW TO section as it contains important information.

<https://noaaweatherradio.org/howto.html>

### **Parts:**

1. Raspberry PI. When writing this document, the PI 5 and PI 4 kits are about the same cost. However, you don't need model 4 or 5. I have tested this method with an old Raspberry PI 2 model 1 Gig of RAM, and it works just as well. Any model PI2 and above should work fine. The program to stream doesn't take much processing power to accomplish this. You also don't need more than 1 Gig of RAM model. But sometimes the kits will come with 4GB for about the same price. You can buy kits directly from Vilros, or from Amazon. These are just a couple of examples of the kits. Almost any full sized PI will do.
  - a. A kit like this comes with a case, power adapter, and SD card. <https://www.amazon.com/Vilros-Starter-Raspberry-Passive-Preloaded/dp/B0DGM87BNB>
  - b. I've had good results with the CANA kits as well. <https://www.amazon.com/Vilros-Starter-Raspberry-Passive-Preloaded/dp/B0DGM87BNB>
2. USB sound card with microphone input. I've tested both of these models.
  - a. <https://www.amazon.com/dp/B01N905VOY/?coliid=I2FHK6IS8B32ET&colid=2C6HYHZM43FSD>
  - b. <https://www.amazon.com/dp/B00IRVQ0F8>

3. A NOAA radio with power adapter and headphone jack. I've tested both of these. The Raynic is much cheaper and works as well as the Midland.
  - a. Raynic: [https://www.amazon.com/dp/B08T1FB7J3?ref=ppx\\_yo2ov\\_dt\\_b\\_fed\\_asin\\_title](https://www.amazon.com/dp/B08T1FB7J3?ref=ppx_yo2ov_dt_b_fed_asin_title)
  - b. Midland WR400: <https://www.amazon.com/Midland-Emergency-M-Localized-Programming/dp/B071HFV836>
4. Audio Attenuator. This takes the headphone level audio and drops it to microphone levels.
  - a. [https://www.amazon.com/dp/B0F9DR496H?ref=ppx\\_yo2ov\\_dt\\_b\\_fed\\_asin\\_title](https://www.amazon.com/dp/B0F9DR496H?ref=ppx_yo2ov_dt_b_fed_asin_title)
5. Not all the PI kits come with a SD card reader. I recommend getting one to install the PI OS to the SD Card. (Optional)
  - a. <https://www.amazon.com/SanDisk-MobileMate-microSD-Card-Reader/dp/B07G5JV2B5?s=electronics>
6. If you do build your own kit, get a Class 10 SD card from a major card maker like SandDisk or Kingston for best reliability.
7. If you need a bit more distance from radio to PI, an audio extension cable like this.
  - a. [https://www.amazon.com/dp/B096S48XF2?ref=ppx\\_yo2ov\\_dt\\_b\\_fed\\_asin\\_title&th=1](https://www.amazon.com/dp/B096S48XF2?ref=ppx_yo2ov_dt_b_fed_asin_title&th=1)

In short, you will image the SD card that comes with the kit. Remote into the PI using a program such as PUTTY. Update the PI OS. Install DARKICE and configure it. There are multiple ways to install the PI OS onto the SD card. I'll step you through just one of the ways. There are also many videos on YouTube using PUTTY, so I won't get into too much detail with those steps.

1. Download the PI imager software. <https://www.raspberrypi.com/software/>
2. Install the SD card into your card reader. Insert the SD card reader into your PC.
3. Run the PI Imager software. Start by picking your model of PI.
4. Pick "Raspberry PI OS (other)".
5. Choose the Raspberry PI OS Lite (64bit).
6. Choose your SD card storage.
7. Give your PI a hostname such as "broadcast" or "pi". The name isn't that important.
8. Pick your time zone.
9. Setup a password for the default PI login.
10. If you are connecting to WIFI, enter in your WIFI information. If you are using wired network, you can leave this blank.
11. Enable SSH.
12. Raspberry Connect isn't needed.
13. Write to your card.

The OS should be installed. Insert the card into the PI. Connect your USB card to the PI. Plug the power into your PI. It should automatically boot.

If you have not installed an SSH terminal to your PC, I recommend using PUTTY. Putty MSI installer for 64 bit will work for most people.

<https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>



Before you can begin, you will need to login to your router and find what IP address your PI has booted up with. It will likely have the hostname you gave above in step 7. I would recommend you configure your PI with a STATIC IP also. That'll make it easier to find your PI on your network later, but it isn't required.

When you copy some of the text below, you should be able to right click in the PUTTY window to paste that text in. Both in the command line and in the NANO program should support right clicking.

Start PUTTY. In the host name/IP address area, enter the IP from your router. Port 22 should be fine. Click the OPEN button.

Login to the system with the account of PI, and the password from step 9.

While the PI imager software downloads the OS, the download doesn't always contain the latest patches. Start by running these two commands. Agree with Y if prompted.

```
sudo apt-get update
```

```
sudo apt-get dist-upgrade
```

These same commands can be run periodically to keep your PI OS up to date.

Reboot the PI with this command.

```
sudo reboot now
```

After the PI reboots, connect and login again with PUTTY.

Install DARKICE with this command. DARKICE is the software that turns the audio from your USB device into a stream to send to an ICECAST server.

```
sudo apt-get install darkice
```

Next, you will need to configure DARKICE. I prefer to use the program NANO to edit the text.

```
sudo nano /etc/darkice.cfg
```

That command will create a blank document. So, your screen will be empty at first. Since this is a command line program, you'll need to use your arrows to move around the page. The first part of the configuration file will set up the system to use your sound card and general connection settings.

*[general]*

*duration = 0*

*bufferSecs = 5*

*reconnect = yes*

*[input]*

*device = hw:0,0*

*sampleRate = 48000*

*bitsPerSample = 16*

*channel = 1*

Below that, you will need to configure your stream. Enter the following information to begin your Stream with NOAAWeatherRadio.org. Your stream mount point should be State dash City dash NOAA Radio station. For example, mine is ND-Bismarck-WXL78. Adjust it accordingly.

The admins on NOAAWeatherRadio.org have a page that goes over this section. This page also contains more information you want to read before you begin your first stream.

<https://noaaweatherradio.org/howto.html>

*# NOAAWeatherRadio.org*

*[icecast2-0]*

*bitrateMode = cbr*

*format = mp3*

*bitrate = 32*

*server = wxradio.org*

*port = 8000*

*password = WxRadio2014*

*mountPoint = STATE-CITY-STATION*

*name = NOAA All Hazards Radio WXL78 162.475 MHz Bismarck ND*

*description = Stream using Raspberry PI5 with darkice and USB sound card*

*url = <https://www.bismarckweather.net>*

*genre = Weather*

*public = yes*

*lowpass = 2500*

If you choose to add a second stream such as Broadcastify, it will have a header of [icecast2-1] instead of 2-0 from above. I've run up to 4 streams personally without taxing the PI. You just keep incrementing the ICECAST number and enter in the new server, mountpoint, password. Broadcastify will provide you with the server, mount point, and password once you've registered an account and have been accepted. If you're not going to use Broadcastify, you can skip this part.

*[icecast2-1]*

*bitrateMode = cbr*

*format = mp3*

*bitrate = 32*

*sampleRate = 22050*

*server = audioX.broadcastify.com*

*port = 80*

*password = GIVEN*

*mountPoint = GIVEN*

*name = NOAA All Hazards Radio WXL78 162.475 MHz Bismarck ND*

*description = Stream using RPI3 with RTL SDR and darkice*

*url = https://www.bismarckweather.net*

*genre = Weather*

*public = yes*

*lowpass = 2500*

In these settings, you can change the name and description as you see fit. The URL is also not needed. "Most" ICECAST servers use port 8000, but not all. You'll want to keep the bitrate, format, bitrateMode, sampleRate as shown to keep network bandwidth to a minimum. NOAAWeatherRadio.org requires those settings.

Lastly, save the file by hitting CONTROL-X. It will prompt for the file name. Agree. It should drop back to the PI command prompt.

Next, you will want to test that your sound card is found. Run this command.

```
arecord -l
```

It should return some lines like below.

```
card 0: Device [USB Audio Device], device 0: USB Audio [USB Audio]
```

```
Subdevices: 1/1
```

```
Subdevice #0: subdevice #0
```

Pay attention to the card and device numbers in yellow. Most of the time, they will be both zeros. But these numbers are what points to the INPUT section of your darkice.cfg file. If for some reason these are not zeros, you'll need to edit your device section to those numbers.

```
device = hw:0,0
```

Power on your radio while not connected to the PI just yet. On the Raynic, you will need to change to the weather band. Tune your radio to your local NOAA station.

Plug your attenuator into the radio headphone port. Then the other end into the red colored port on the USB sound card. Set the attenuator to -20 db. On Raynic radio, I'm using volume 15. On the Midland radio, I have the volume set to the midpoint. But you may need to adjust this later.

To start testing darkice, enter the command:

```
sudo darkice /etc/darkice.cfg
```

Hopefully you will see this on the screen.

```
Darklce 1.5 live audio streamer, http://code.google.com/p/darkice/
```

```
Copyright (c) 2000-2007, Tyrell Hungary, http://tyrell.hu/
```

```
Copyright (c) 2008-2013, Akos Maroy and Rafael Diniz
```

```
This is free software, and you are welcome to redistribute it
```

```
under the terms of The GNU General Public License version 3 or
```

```
any later version.
```

```
Using config file: /etc/darkice.cfg
```

```
Using ALSA DSP input device: hw:0,0
```

```
Using POSIX real-time scheduling, priority 4
```



At this point, you should be able to browse to NOAAWeatherRadio.org to see your stream at this link. Scroll down and find the MOUNTPOINT you configured earlier.

<https://wxradio.org/status.xsl>

To listen to the stream, click on the MP3 button link following your station.

If you can hear it, SUCCESS! Now it would be a good time to compare the volume of your station compared to the other stations listed and adjust it accordingly.

To exit the broadcast, hit CONTROL-C. It should drop back to the command prompt.

The last step is to configure DARKICE to automatically begin when your PI is powered on. Run this command.

```
crontab -e
```

Use your arrow keys to get to the bottom of the file. Add this command in. This will start DARKICE 30 seconds after the PI fully boots up.

```
@reboot sleep 30 && /usr/bin/darkice -c /etc/darkice.cfg
```

CONTROL-X to exit.

If for some reason you want to stop DARKICE after your PI has booted, enter this command.

```
pkill darkice
```

To put things back into normal running mode, just do the PI reboot and let DARKICE start normally.

```
Sudo reboot now
```

Lastly, I would recommend signing up for Chappelle Weather's quality reports. They will periodically test your stream for quality and volume levels. With an external radio, about all you can do is figure out the best place in your house that has the least amount of noise on the radio. With the Midland, you can buy an external antenna to help with reception. But I have not used one of those, so I can't comment if it is worth it. Chappell will also let you know if your volume levels are good.

<https://chappelleweather.com/nwrorg/quality/tools/more-info.php>

I have also tested a device called a "ground loop isolator". This is a device that would go in line with your 3.5 mm sound cable. In my testing with this device, I did not notice a difference in sound quality. I personally don't feel one is necessary for this setup.

The sound card input isn't stereo, it's mono. I've tested various mono cables and adapters. It doesn't seem to make any difference. The stereo cables and attenuator work just fine.