



# RedVox User Manual – Android

The RedVox app uses smartphone sensors to collect environmental data such as infrasound, acceleration, gyroscope, magnetic field, and brightness.

Device Used: Samsung Galaxy S8

App Version: v2.3.15

Release Date: 10/26/18

Support: dev@redvoxsound.com

## Contents

1	Installing the App and First Use .....	2
2	Creating an Account .....	6
3	Adjusting Settings .....	7
4	Optimizing a Device for Data Collection .....	9
5	Collecting and Visualizing Data .....	11
6	Accessing Data .....	15
6.1	Network Status.....	16
6.2	Data Explorer.....	23
6.3	Generate RedVox Report .....	26
6.4	Retrieving Files from Devices .....	28
6.4.1	Samsung Galaxy S8 Example.....	28
6.4.2	Google Pixel 2 Example .....	31
7	Installing Python .....	34
7.1	Installing Python on a Mac Laptop .....	34
7.2	Installing Python on a Windows Computer .....	35
8	Opening Jupyter Notebook and Reading RDVX Files .....	37

\* This is a living document and will be updated often. For the best results, use the user manual that corresponds to the app version.

# 1 Installing the App and First Use

1. Download the app from the Play Store.
2. Once it is installed, open the app.
3. A pop up will ask for the following permissions to collect data:
  - a. Record audio.

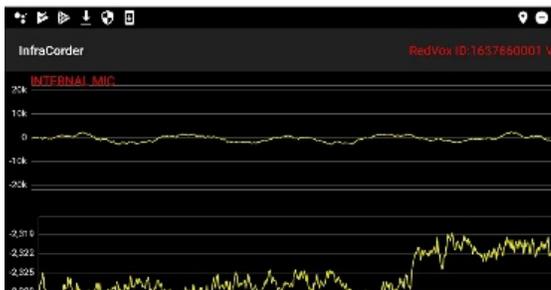
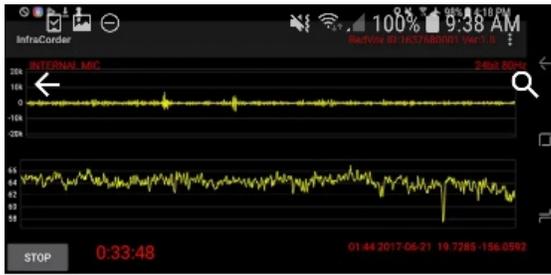


Figure 1: Google Play Store

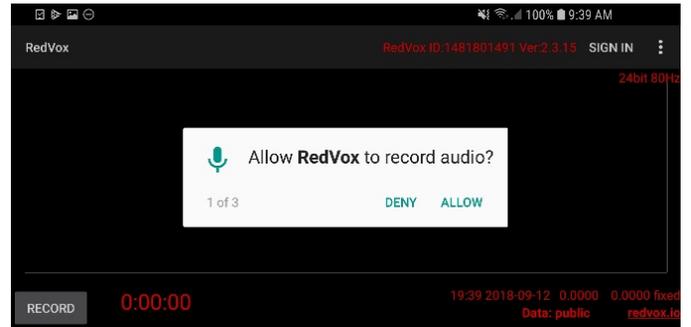


Figure 2: Audio Permission Pop-Up

- b. Allow saving to the RDVX file directory. Permission will be requested to access photos, media, and files on device, as it is standard Google dialogue.

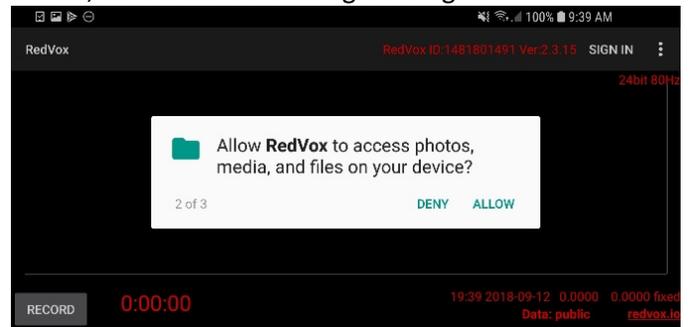


Figure 3: File Permission Pop-Up

- c. Access the device location. The location is used for geospatial analysis.

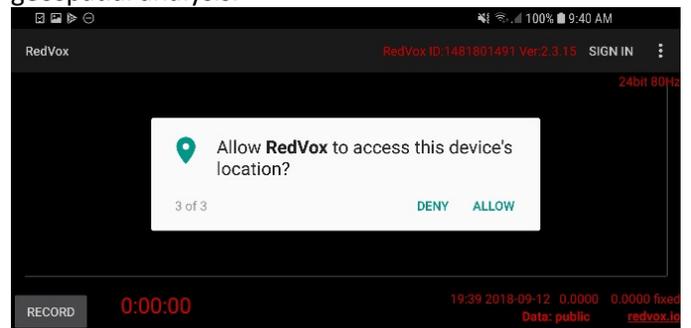


Figure 4: Location Permission Pop-Up

4. Tap Record (the button is highlighted in orange below).

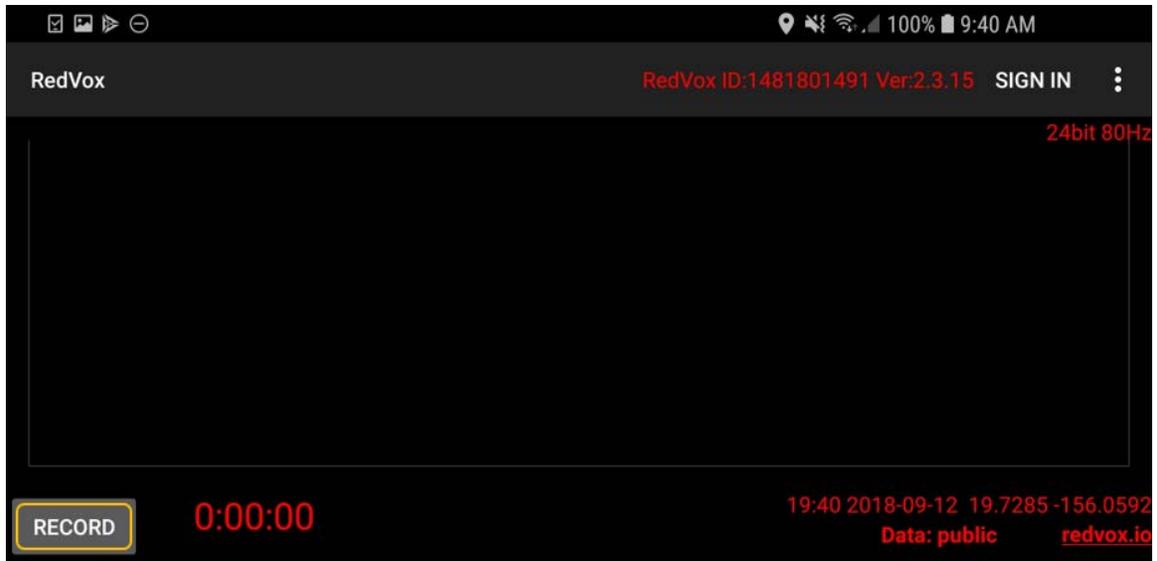


Figure 5: RedVox Home screen

5. Scroll through and accept the Privacy Policy ([redvoxsound.com/policy](http://redvoxsound.com/policy)).

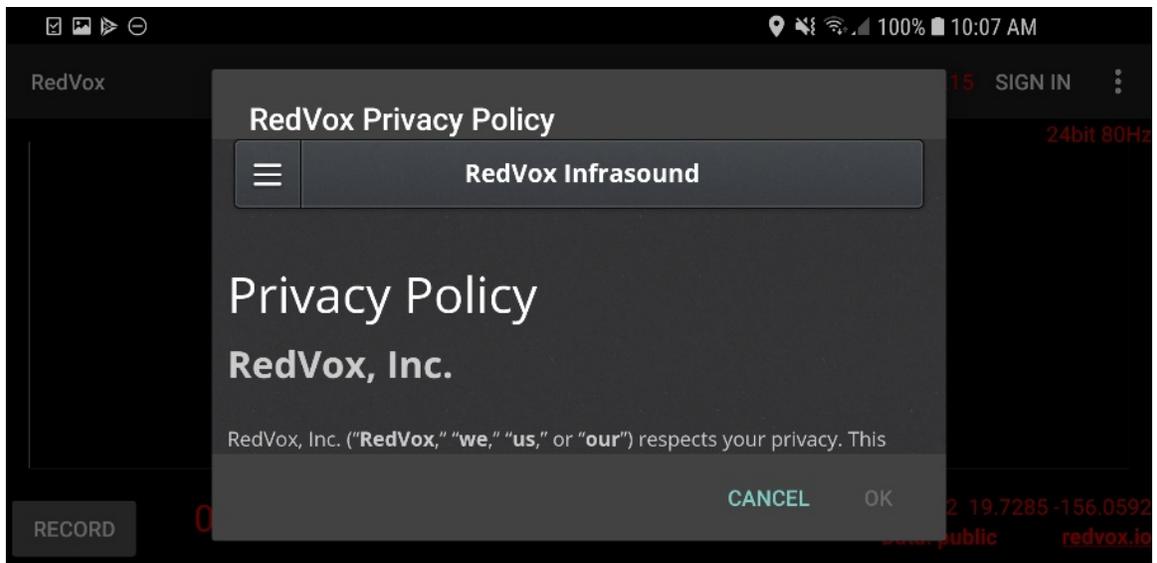


Figure 6: Privacy Policy Pop-up

6. The screen should start to plot a waveform and the timer at the bottom left should start to increment. See below for reference.

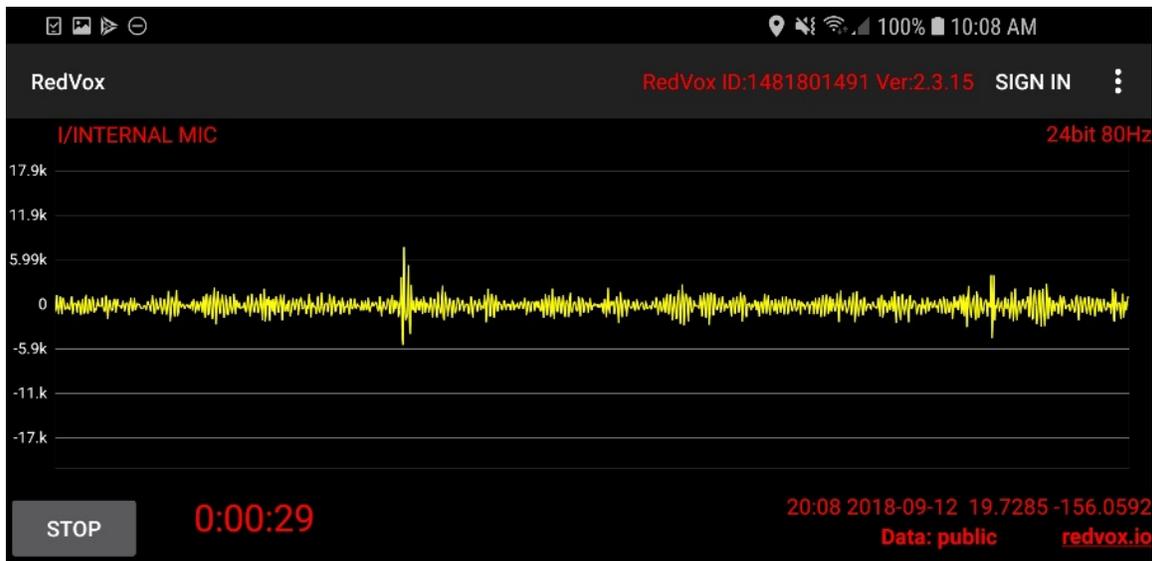


Figure 7: First Recording

- a. The app will collect infrasound with a default sampling rate of 80Hz. The sampling rate can be seen in the top right-hand corner (highlighted in orange). The sampling rate is how many samples are being collected per second. The Universal Time, device location, and RedVox data privacy status can be seen in the bottom right corner of the screen (highlighted in orange).

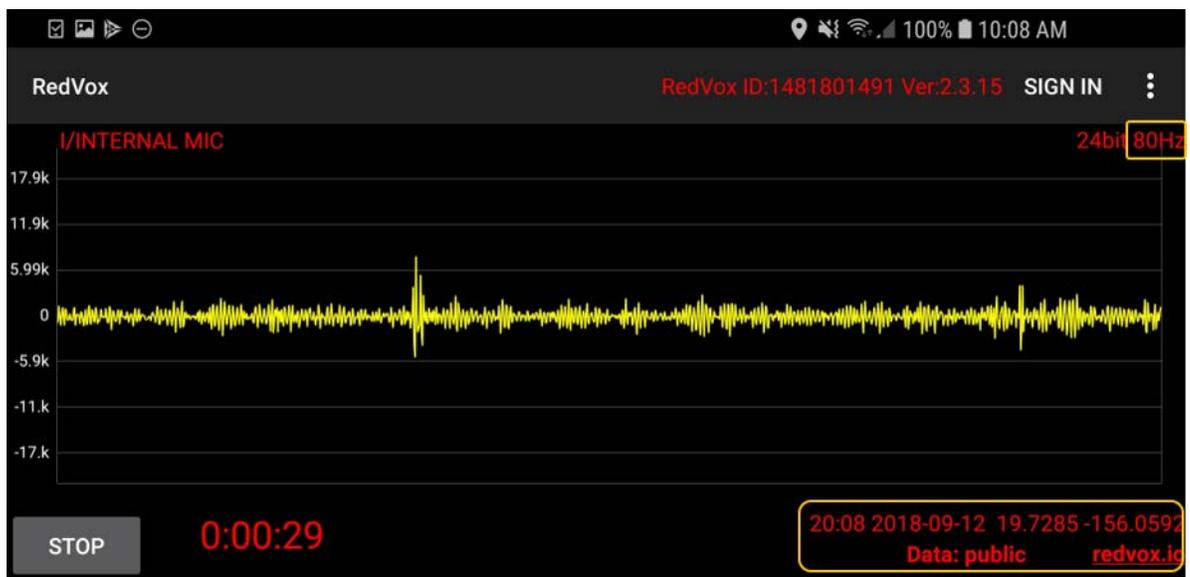


Figure 8: Sampling Rate Location on Home Screen

- b. If data is not saving to the Cloud storage, a number and SYNC ERR will pop up on the bottom of the screen. The number indicates how many files are backed up on the device (not being saved to the Cloud storage). This error is either due to not having communication or a strong bandwidth.



Figure 9: Sync Error Pop Up

7. To stop collecting data, tap on the Stop button. A pop up will appear asking to Stop Recording?, tap OK and data will stop being collected. The timer on the bottom left will also stop.

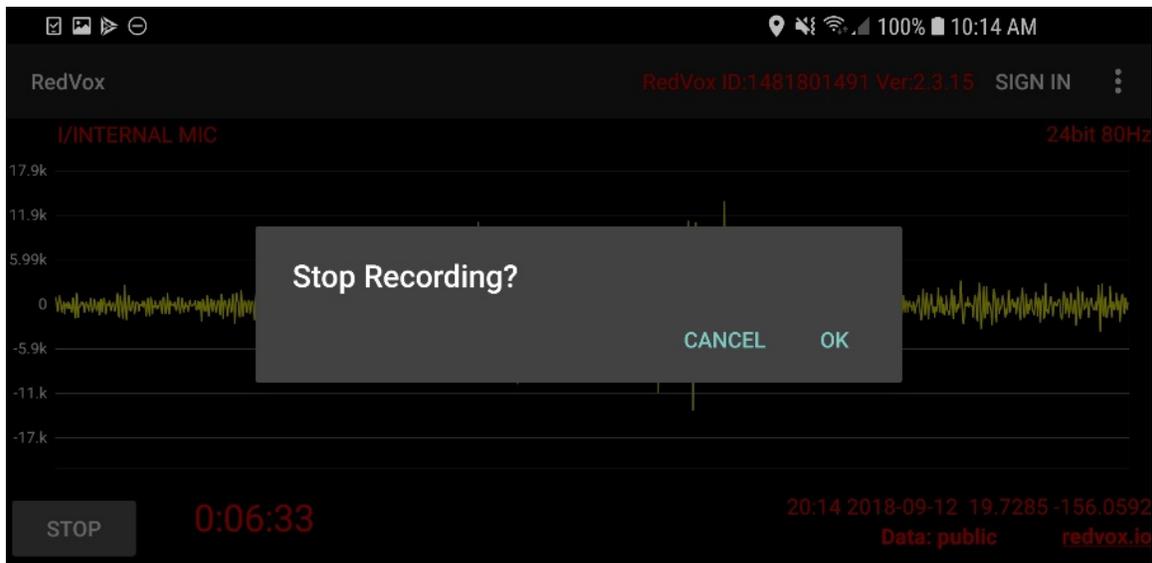


Figure 10: Stop Recording

8. To exit the app, go to the phone's task manager and swipe to close the app, or press the Back arrow twice. Recording and location tracking stops when the app is closed.

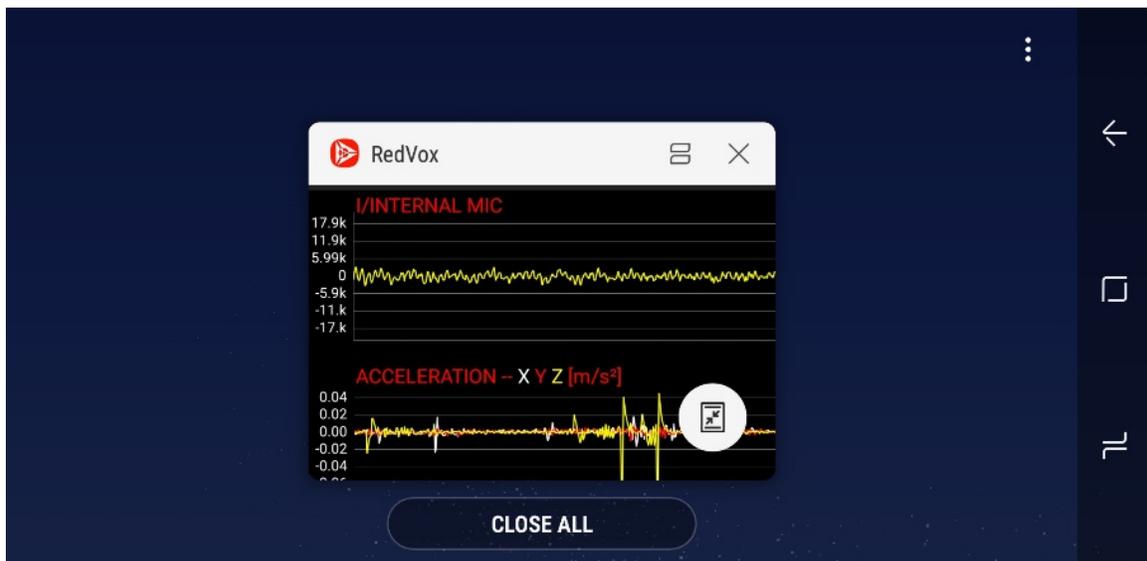


Figure 11: Samsung Task Manager

- a. To ensure that the app has stopped running, check the status bar on the top of the screen. If the RedVox icon is there – the app is still running, if it is not – the app stopped running.

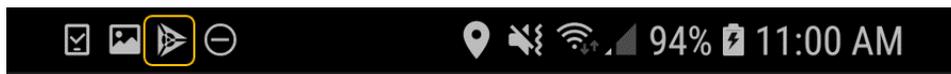


Figure 12: Status Bar with Icon Indicating that App is Still Running

## 2 Creating an Account

1. Open the RedVox app. In the bottom right there is a link to the RedVox website: [redvox.io](http://redvox.io). Tap on it and it will direct the screen to a web browser.



Figure 13: Link in App

2. In the top right corner of the screen, tap the Register button.

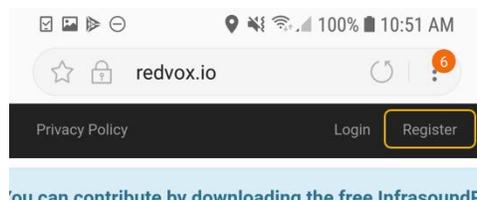
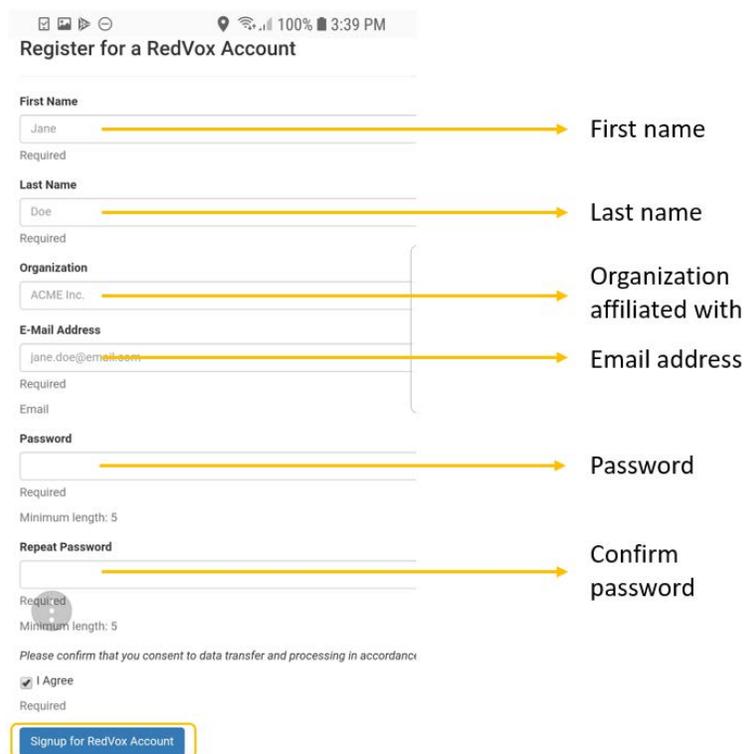


Figure 14: redvox.io > Register

3. The screen will be directed to the page shown below. Fill out the areas and tap Signup for RedVox Account.



Register for a RedVox Account

First Name  
Jane → First name  
Required

Last Name  
Doe → Last name  
Required

Organization  
ACME Inc. → Organization affiliated with

E-Mail Address  
jane.doe@email.com → Email address  
Required  
Email

Password  
→ Password  
Required  
Minimum length: 5

Repeat Password  
→ Confirm password  
Required  
Minimum length: 5

Please confirm that you consent to data transfer and processing in accordance with our Privacy Policy.

I Agree  
Required

Signup for RedVox Account

Figure 15: Register Page

**\*\*NOTE:** A RedVox account is needed to access some features in app as well as analysis and device details on [redvox.io](http://redvox.io).

4. Log in on the app, tap on SIGN IN, located in the top right of the screen.

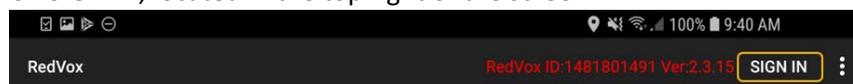


Figure 16: Sign In, in App

### 3 Adjusting Settings

1. Open the RedVox app.
2. Tap on Record to start collecting data.
  - a. If automatic recording is desired upon opening the app or after a restart, go to  > Settings. The two settings highlighted below are ideal for automatic recording when the app is launched.
3. Tap Stop to stop collecting data.
4. The user can allot a certain amount of internal storage for the data files. This can be done by going to  > Settings > Storage Space Allowance > Enter amount of storage (in Gb) > OK.

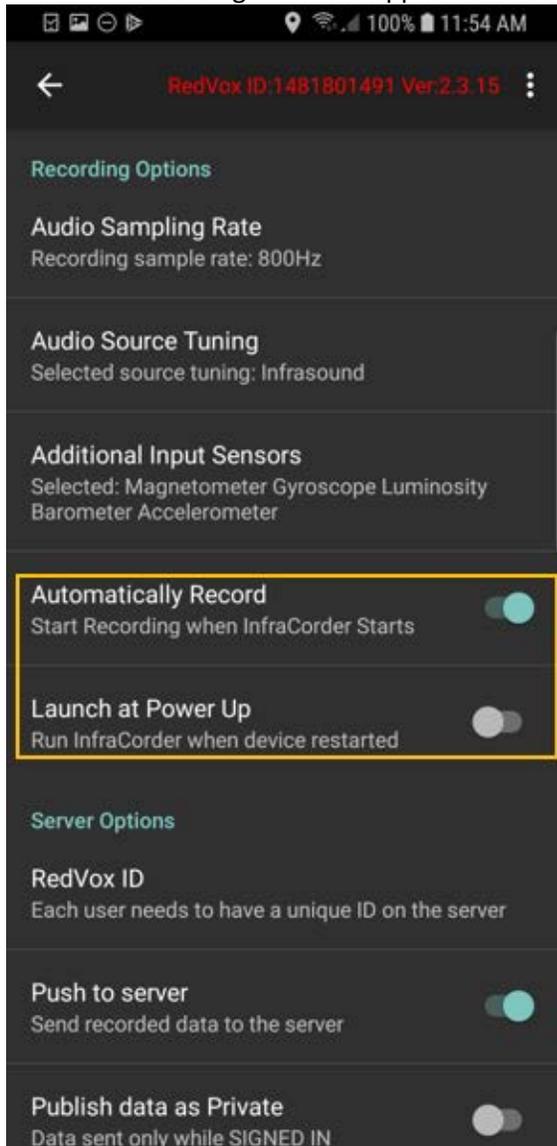


Figure 17: Automatic Recording Settings

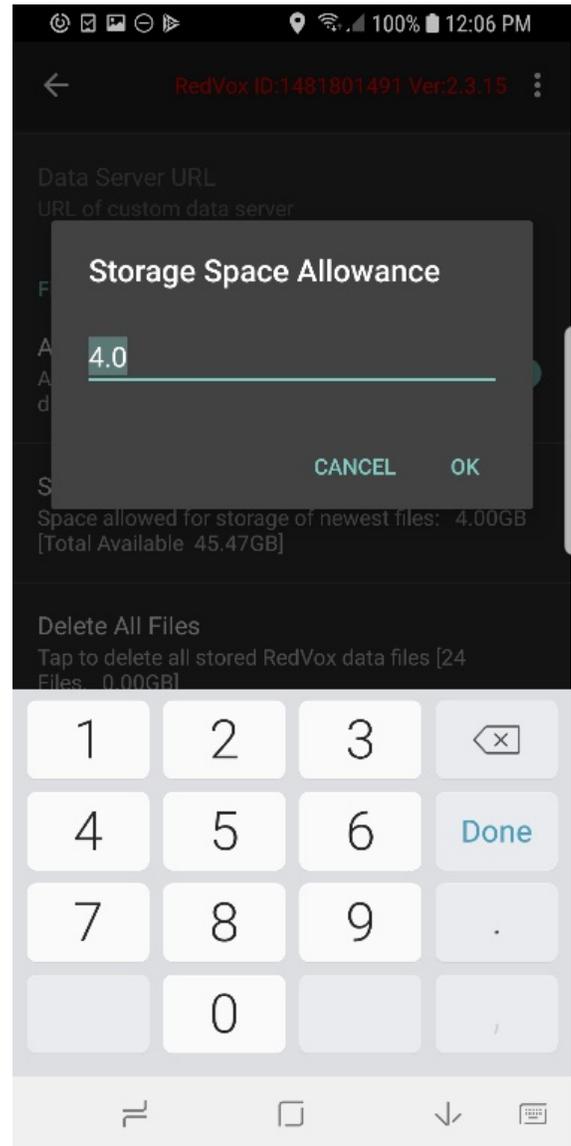


Figure 18: Storage Allowance for Data Files

**\*\*NOTE:** Launch at Power Up is a useful setting when there is a designated device for data collection. If the device were to shut off and restart, data will automatically start being collected upon restart.

5. To create an ID for the device that is being used, go to **☰** > Settings > RedVox ID. Below shows the RedVox ID screen.

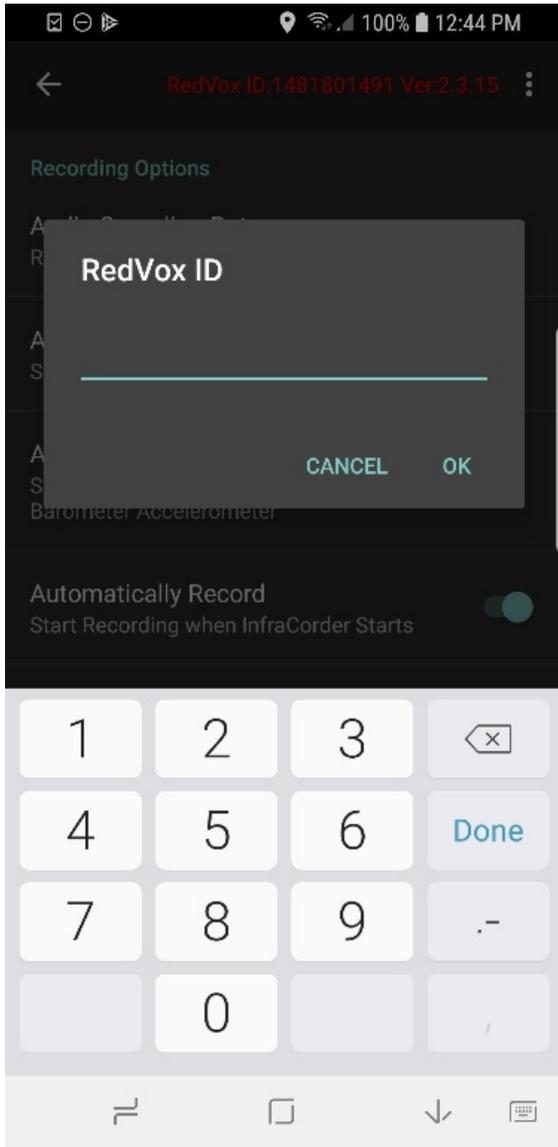


Figure 19: Creating a RedVox ID

6. Once the 10-digit RedVox ID is created, tap OK to save the ID. The RedVox ID for the designated device will show up on the app Home screen. A RedVox ID is recommended for keeping track of all the devices used for data collection.

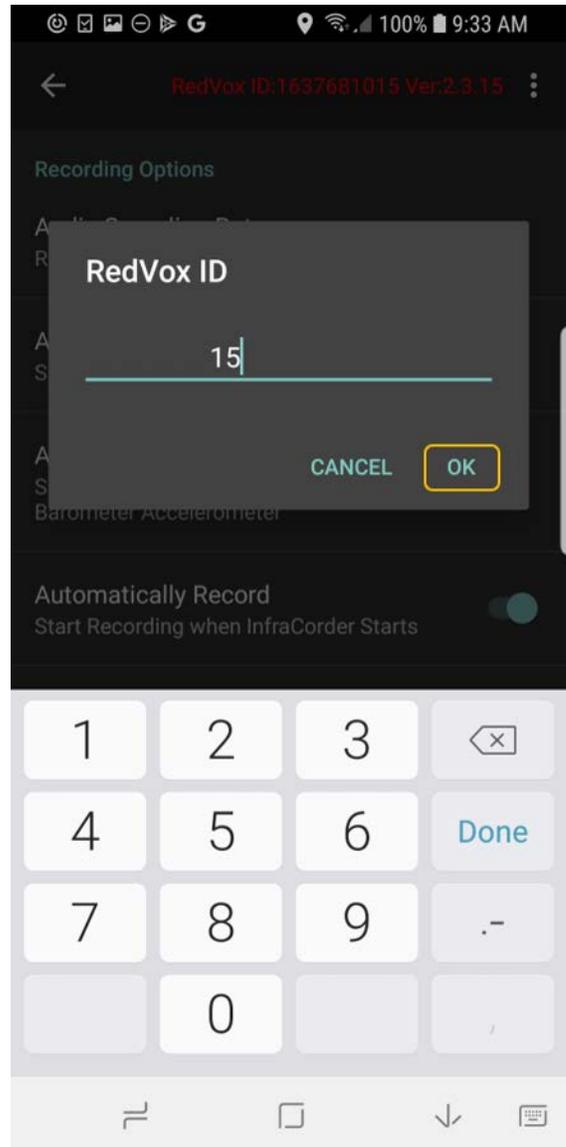


Figure 20: Saving the RedVox ID

**\*\* NOTE:** The RedVox ID can be up to 10 digits. If it is less than 10 digits, RedVox will fill the remaining digits with zeros (ie. 15 will look like 0000000015).

## 4 Optimizing a Device for Data Collection

If the device is going to be designated for data collection, these steps are recommended for optimizing the system. The goal is to conserve power and preserve a nearly-constant data transmission bandwidth.

1. Turn off all communications on the device except cell data or Wi-Fi.
2. Standardize the home screen of the devices to make it easier to navigate through all the apps.
  - a. Recommended apps to have readily available on the foreground: Google Chrome, Settings, and Files.
3. Turn off apps that are not needed for data collection and may consume power and bandwidth.
4. Turn on Developer settings on phone (go to About Device > Build Number > Tap 6 times). Most of the Developer settings are the defaults, but some of them can help optimize continuous recording performance for long deployments.
5. The recommended settings checklist for a sensor that may be changing locations and is using Wi-Fi communications is provided in the figure below.
6. If using Cell communications exclusively for data transfer, turn off Wi-Fi to save power. Will have to turn off Airplane Mode, and confirm Bluetooth is off.
7. Go to the Play store, under Settings, turn off Notifications, turn off Auto-update apps to keep preserve bandwidth.
8. Under Accounts, turn off Back Up Data to preserve bandwidth.
9. If the device location is fixed and known, go to the RedVox App Settings, turn off Use Location Services, and input the latitude and longitude of the unit in decimal degrees. This will conserve power.

	Setting	ON	OFF
<b>CONNECTIONS</b>	Wi-Fi	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Bluetooth	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Phone visibility	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Airplane mode	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	NFC and payment	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Location (High Accuracy)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>SOUNDS AND VIBRATION</b>	Nearby device scanning (Advanced)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Vibrate when ringing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Use volume key for media	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Do not disturb (Allow exceptions > No exceptions)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Touch sounds	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Screen lock sounds	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Charging sound	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Vibration feedback	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Dialing keypad tones	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Keyboard sound	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>DISPLAY</b>	Keyboard vibration	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Auto brightness	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Blue light filter	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Screen mode > Adaptive display	<input type="checkbox"/>	<input type="checkbox"/>
	Screen resolution > FHD+ (2220x1080)	<input type="checkbox"/>	<input type="checkbox"/>
	Home screen > App icon badges	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Home screen > Add apps to Home screen	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Home screen > Quick-open notification panel	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Easy mode	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Icon frames > Icons with frames	<input type="checkbox"/>	<input type="checkbox"/>
	Edge screen > Edge panels	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Edge screen > Edge lighting	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	LED indicator	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Status bar > Show recent notifications only	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Status bar > Show battery percentage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Block accidental touches	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Screen saver	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>GENERAL</b>	General management > Date and Time	<input type="checkbox"/>	<input type="checkbox"/>
	Automatic data and time	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Use 24-hour format	<input checked="" type="checkbox"/>	<input type="checkbox"/>

	Setting	ON	OFF	
<b>ADVANCED FEATURES</b>	Smart stay	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Games > Game launcher	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	One-handed mode	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Finger sensor estures	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Quick launch camera	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Device assistance app > Analyze on-screen text	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Device assistance app > Analyze on-screen images	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Multi window > Use Recents button	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Multi window > Pop-up view action	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Smart capture	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Palm swipe to capture	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Direct call	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Smart alert	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Easy mute	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Swipe to call or send message	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Send SOS messages	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Direct share	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Video enhancer	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<b>LOCK SCREEN AND SECURITY</b>	Screen lock type > PIN	<input type="checkbox"/>	<input type="checkbox"/>
		Secure lock settings > Lock instantly with power key	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Secure lock settings > Auto factory reset		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Secure lock settings > Lock network and security		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Face recognition		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Iris Scanner		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Fingerprint Scanner		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Always On Display		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Clock and FaceWidgets > Roaming clock		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Notifications		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
App shortcuts > Left shortcut > Settings		<input type="checkbox"/>	<input type="checkbox"/>	
App shortcuts > Right shortcut > RedVox		<input type="checkbox"/>	<input type="checkbox"/>	
App permission monitor		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Device Maintenance > Battery		<input type="checkbox"/>	<input type="checkbox"/>	
<b>BATTERY</b>	Power saving mode	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Unmonitored Apps > Add apps > RedVox	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

	Setting	ON	OFF
<b>DEVELOPER OPTIONS</b>	Stay awake	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Bluetooth HCI snoop log	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Picture color mode	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	WebView implementation > Chrome	<input type="checkbox"/>	<input type="checkbox"/>
	Auto update system	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Demo mode > Enable demo mode	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Quick settings developer tiles > Power saving	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Quick settings developer tiles > Sync	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Quick settings developer tiles > Show layout boundaries	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Quick settings developer tiles > GPU rendering profile	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Quick settings developer tiles > Force RTL layout	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Quick settings developer tiles > Window animation scale	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Quick settings developer tiles > Screen saver	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	USB debugging	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Include bug reports in power	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	View attribute inspection	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Verify apps via USB	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Authorize wireless display device	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Wi-Fi verbose logging	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Aggressive Wi-Fi/cell handover	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Allow Wi-Fi roaming scans	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Keep mobile data turned on	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Disable absolute volume	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Show touches	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Show pointer location	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Show screen updates	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Show layout boundaries	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Force RTL layout	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Force GPU rendering	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Show GPU view updates	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Show hardware layer updates	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Turn on 4x MSAA	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Turn off hardware overlays	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Prevent USB audio routing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Strict mode	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
GPU rendering profile	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Do not keep activities	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Show all ANRs	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Show notification channel warnings	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Force allow apps on external	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Force activities to be resizable	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Figure 21: Recommended Android Settings for WiFi Communications

## 5 Collecting and Visualizing Data

1. To enhance the quality of the data being collected, go to  > Settings > Audio Sampling Rate > 800 Hz. The sampling rate can be seen in the top right of the Home screen when collecting data. In order to collect data with a sampling rate of 8000 Hz, an account needs to be logged into in the app.
2. Add sensors by going to  > Settings > Additional Input Sensors > Select all desired sensors > OK > Back. The other sensors that can be plotted are: gyroscope, luminosity, barometer, and accelerometer. Older devices may not have all of these sensors, so the readings will be inadequate.

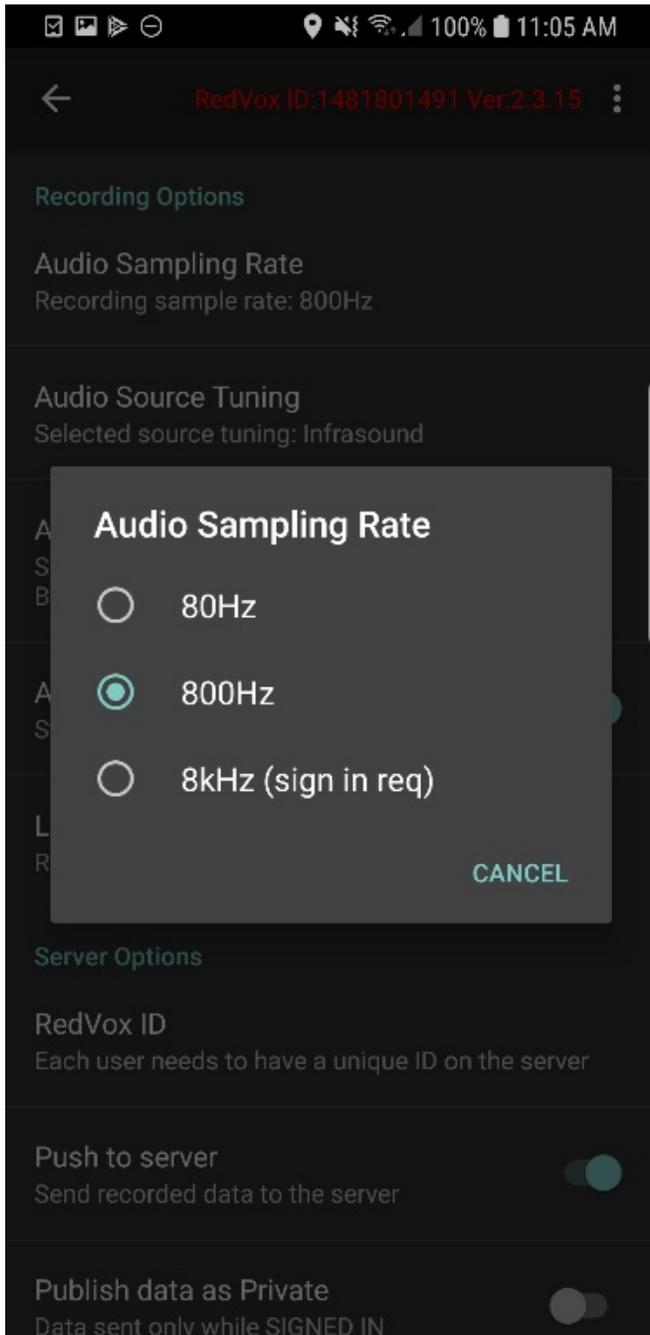


Figure 22: Changing the Sampling Rate

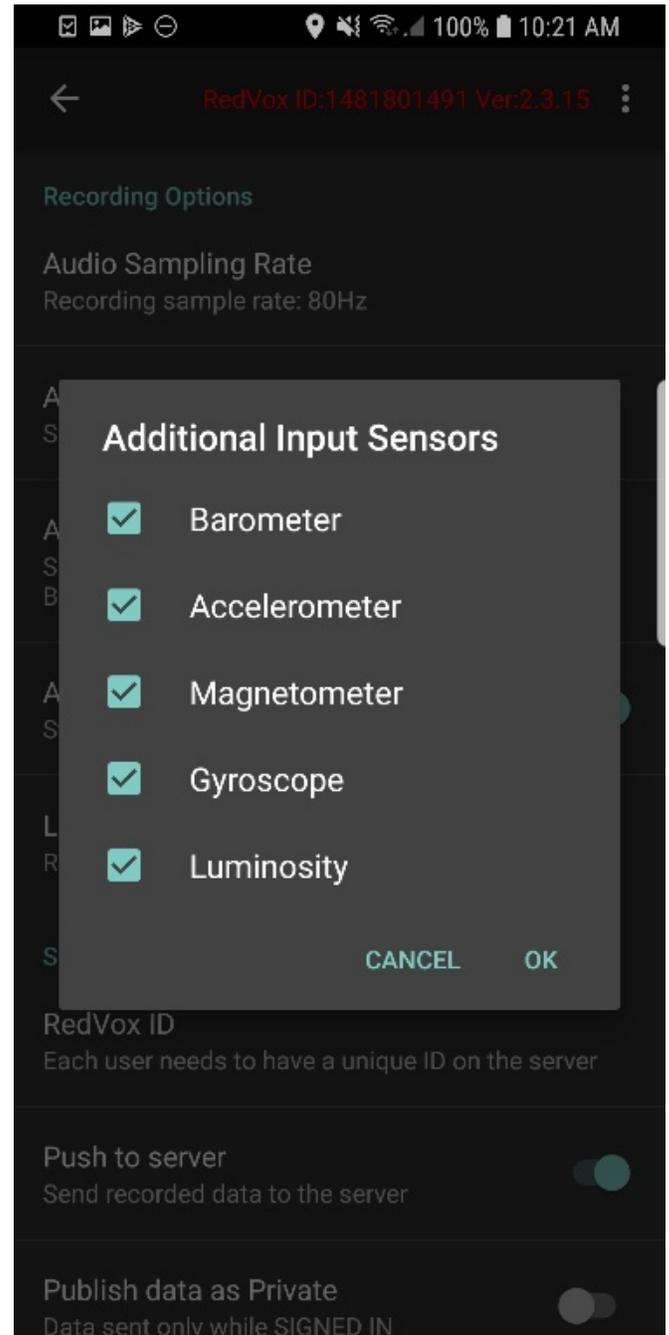


Figure 23: Adding More Sensors

- a. There should be different plots to choose from in  > Graphs. The screen should look like the figure below.

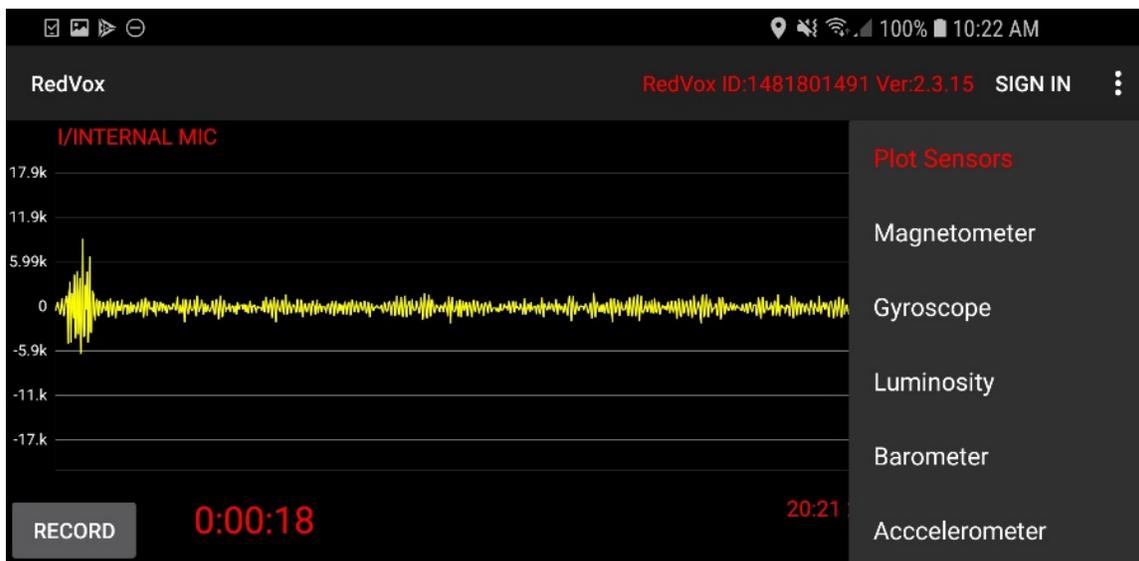


Figure 24: Adding Another Sensor Plot

- b. In the example below, the internal microphone and barometric pressure data are being plotted.

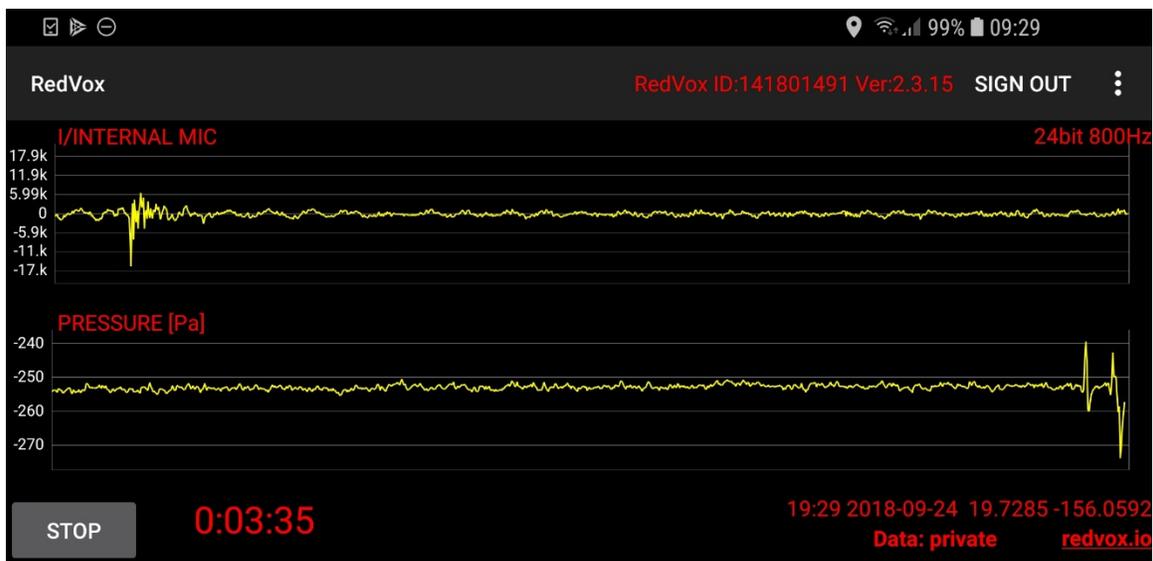


Figure 25: Two Waveforms being Plotted

3. Go to  > Settings > Push to Server > Enable. This is the default. Push to Server will store the collected data in the cloud storage. The files will automatically go to the cloud storage. Files that are not pushed to cloud storage will be backed up on the device (see Installing the App and First Use > 6b).

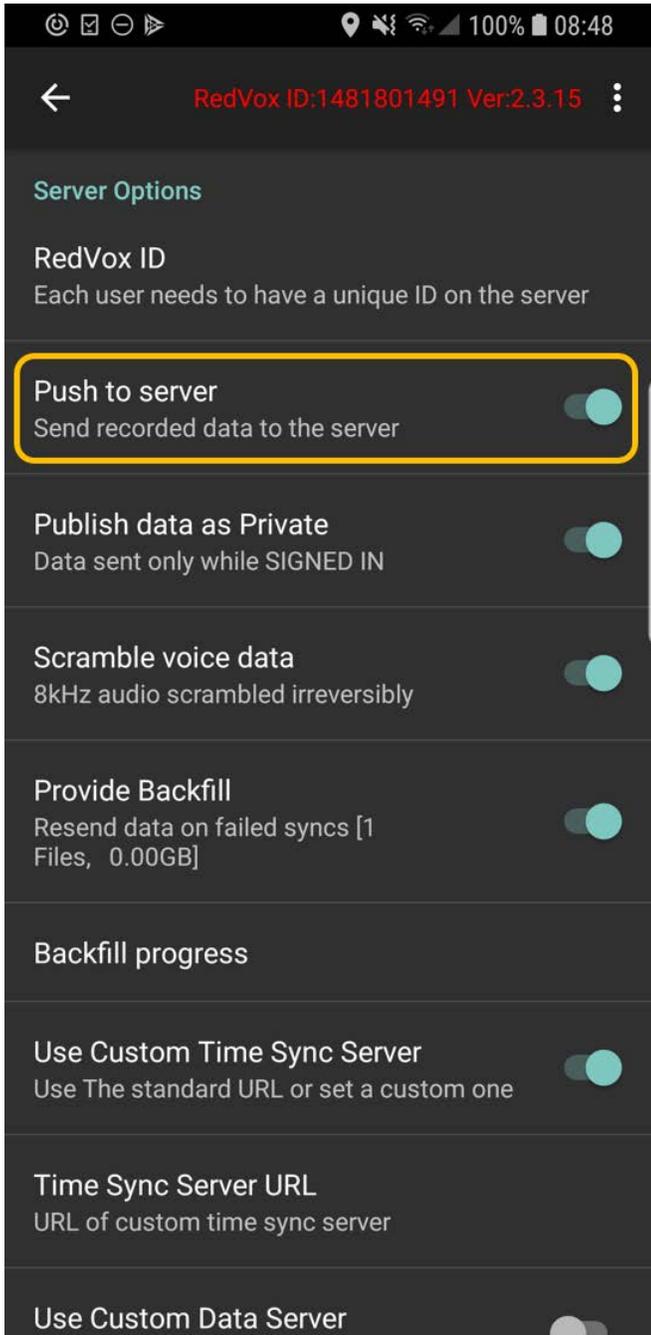


Figure 26: Push to Server

4. The collected data can be published as private which only allows the account affiliated with the device(s) can see the data. If the device is left as a public device, anyone can see the data that was collected. If privacy is an issue, the recommended setting is private.

Go to  > Settings > Publish data as Private > Enable.

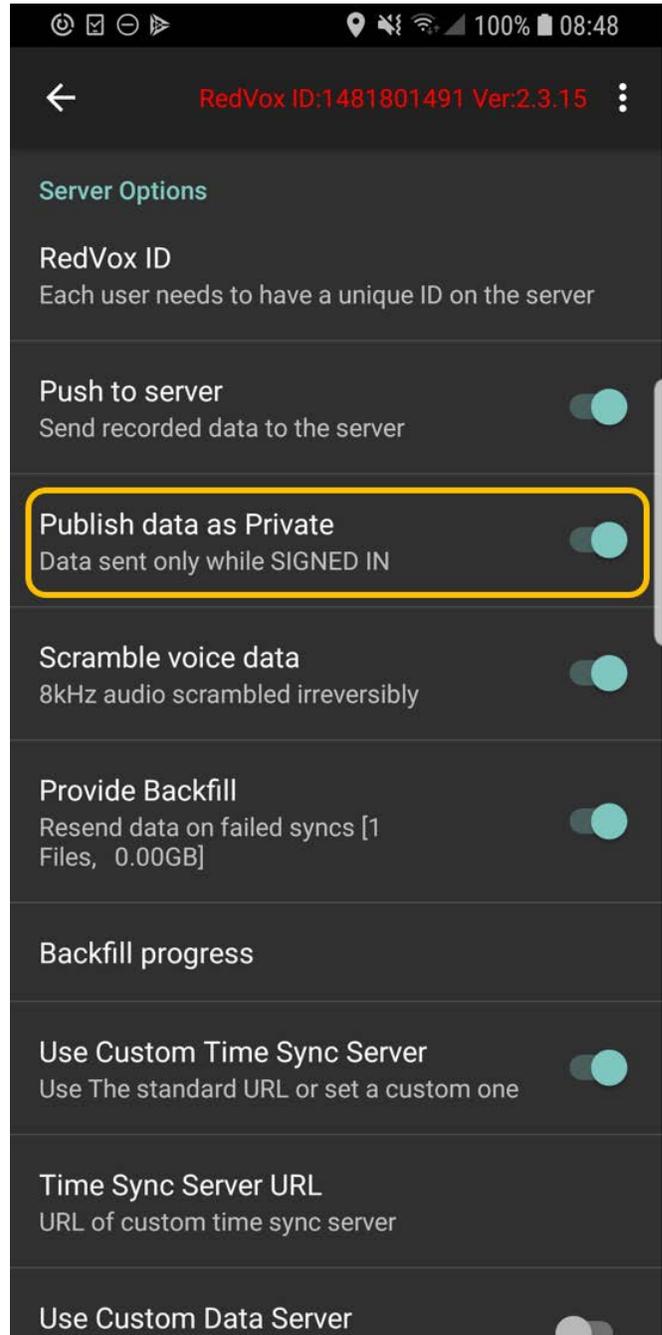


Figure 27: Publish data as Private

5. This is an Expert setting. When higher time accuracy is required, it is possible to direct the app to a RedVox Time Sync Server. Details to be described in a separate section.

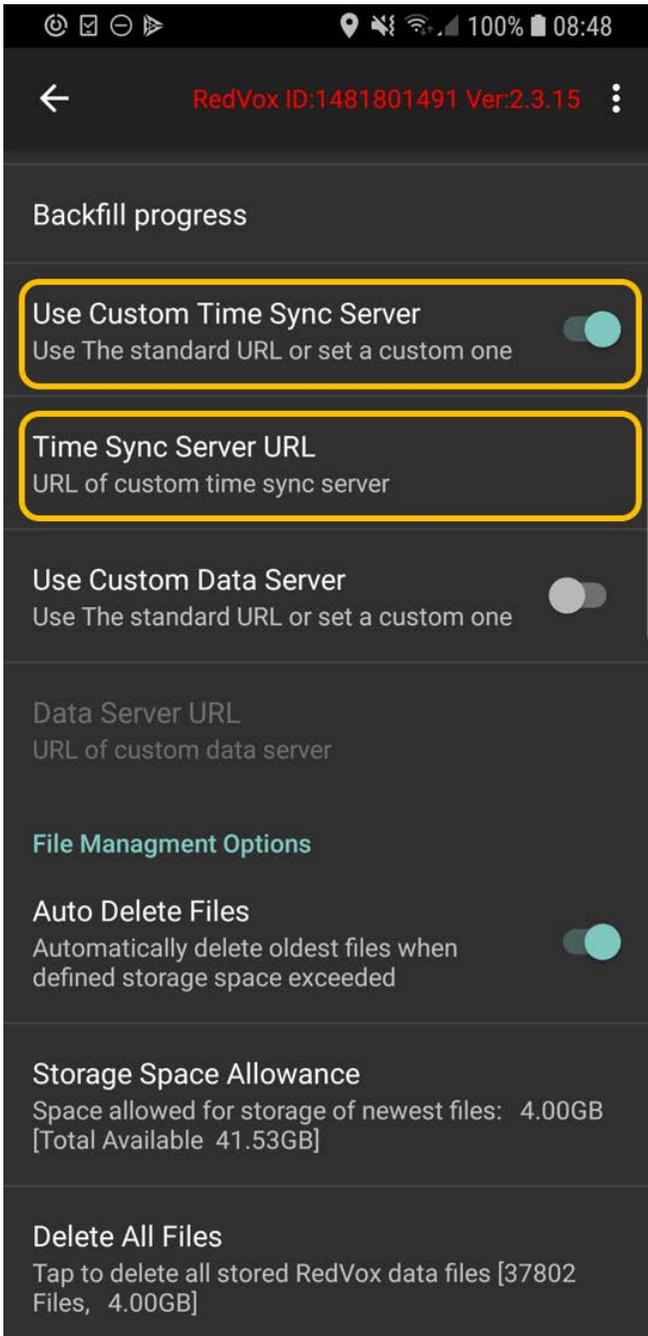


Figure 28: Custom Time Sync Server

6. This is an Expert setting. To have data files be sent to the custom data server, go to Settings > Use Custom Data Server > enable > Data Server URL > enter URL. Details to be described in a separate section.

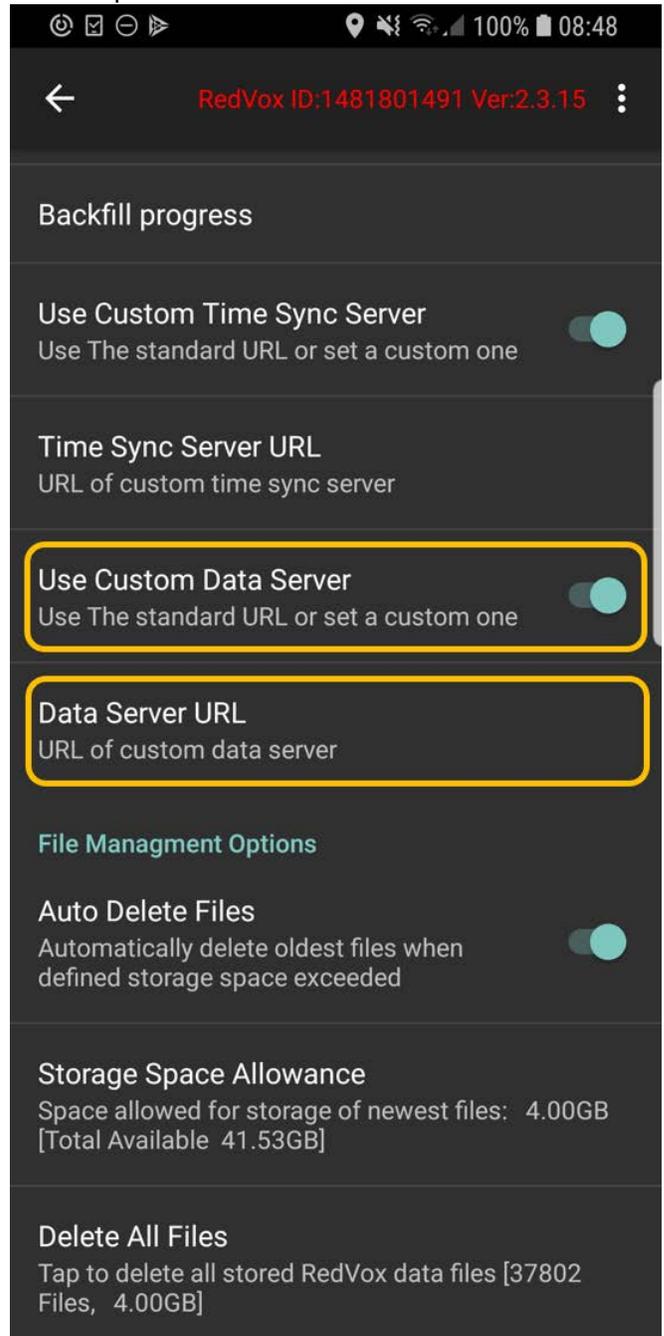


Figure 29: Custom Data Server

## 6 Accessing Data

There are different ways to access collected data. This section will go over different ways to access the RedVox data files.

- i. RedVox.io > Network Status > Active Devices
- ii. RedVox.io > Network Status > Data Explorer
- iii. RedVox.io > Analysis > Generate a RedVox Report
- iv. Device > Files > RDVX file
  - a. Connect to a computer
  - b. Email RDVX files

As of the time being, a RedVox Reader SDK is only available for Python. However, the RedVox API 900 is described in detail in the SDK documentation. Please refer to <https://redvox.io/downloads>



3. Then go to Network Status > Active Devices. The Active Devices' page is useful for showing which devices are currently collecting data.

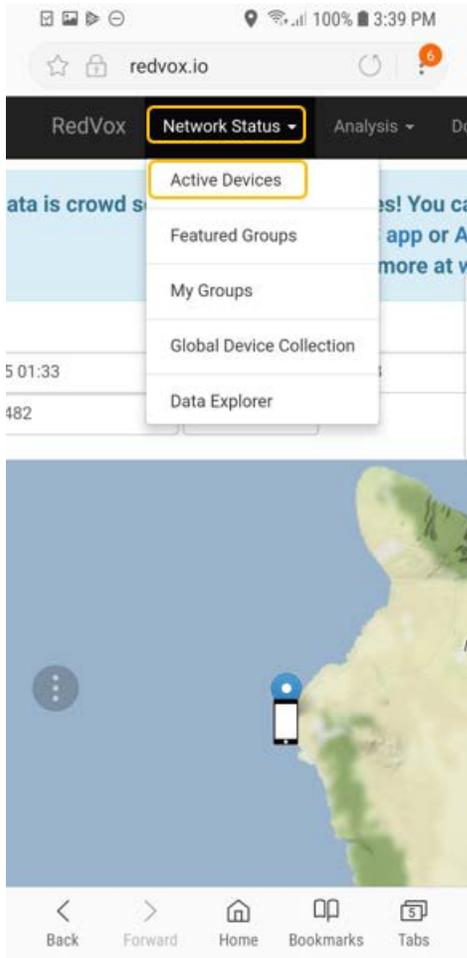


Figure 33: Accessing System Status

a. The Active Devices page will be a list of all devices under the account that is signed in and is recording data.

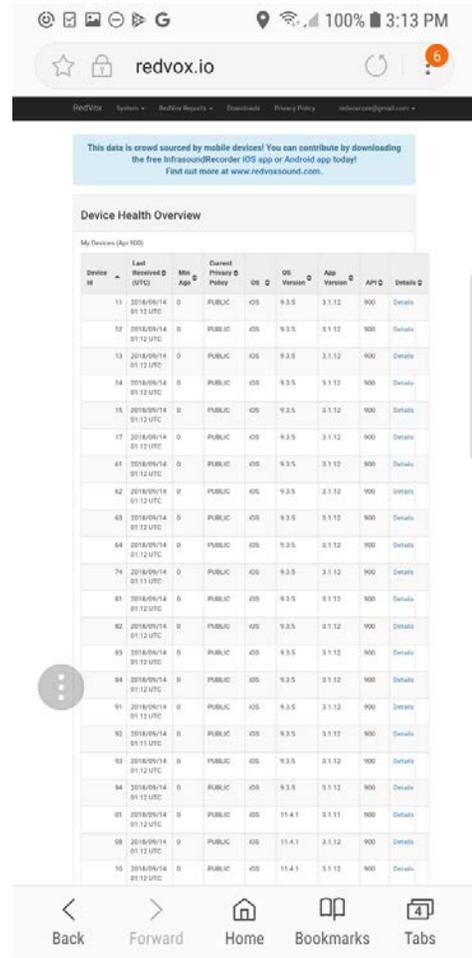


Figure 34: Selecting Device to look at Data

4. Find the desired device and tap on Details.

Device ID	Last Reported (UTC)	MSN	Age	Current Priority Policy	OS	OS Version	App Version	API ID	Details
13	2018/09/14 01:12 UTC	0		PRIVATE	Android	8.0.0	2.3.15	900	Details
14	2018/09/14 01:12 UTC	0		PRIVATE	Android	8.0.0	2.3.15	900	Details
15	2018/09/14 01:12 UTC	0		PRIVATE	Android	8.0.0	2.3.15	900	Details
16	2018/09/14 01:12 UTC	0		PRIVATE	Android	8.0.0	2.3.15	900	Details
17	2018/09/14 01:12 UTC	0		PRIVATE	Android	8.0.0	2.3.15	900	Details
18	2018/09/14 01:12 UTC	0		PRIVATE	Android	8.0.0	2.3.15	900	Details

Figure 35: Tapping on Details for a Particular Device

5. The page will look like the figure below.

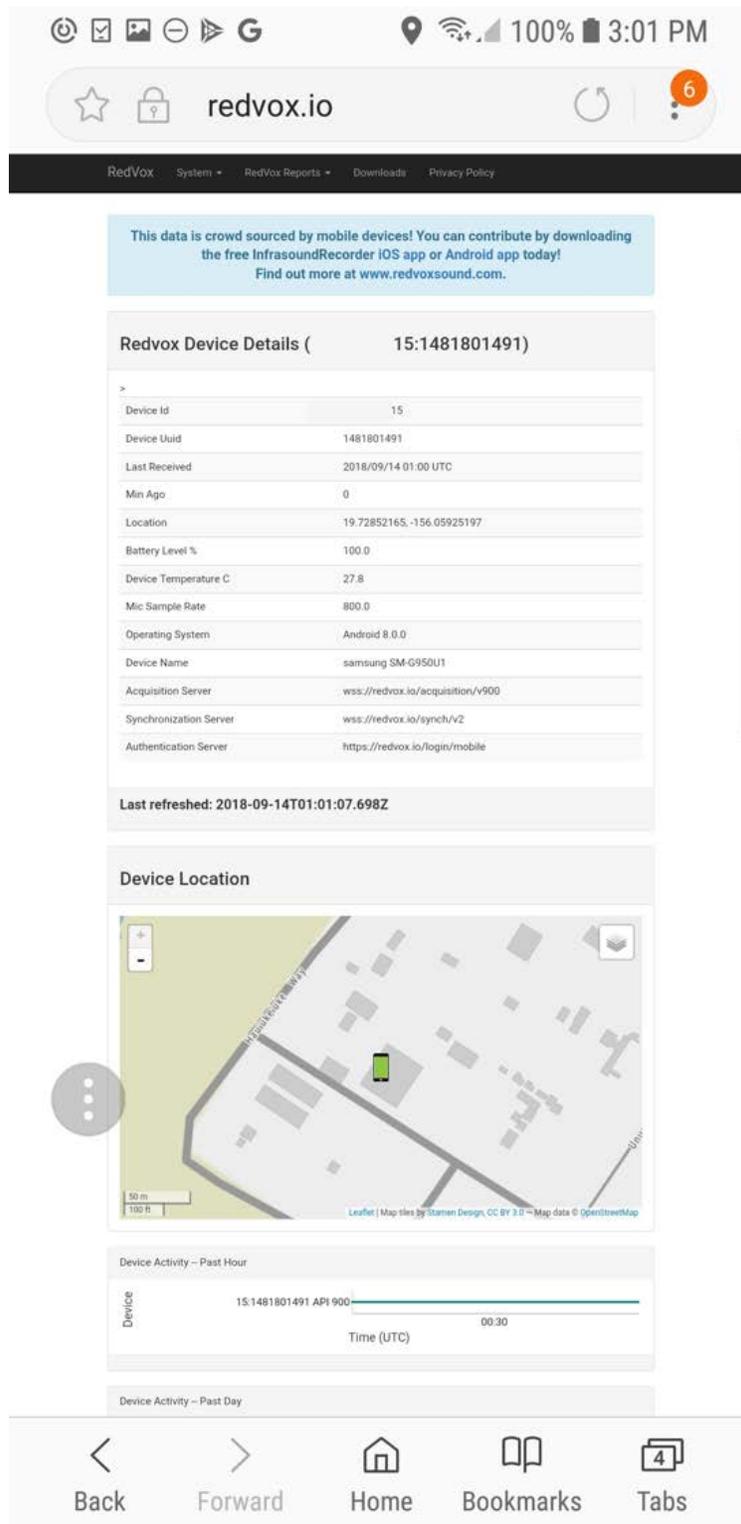


Figure 36: Details about Selected Device

a. This page includes a lot of information. It will include the device's location and activity – up time, spectrograms, scalograms, latencies, accuracy, standard deviations of longitude, latitude, and altitude. An overview of all the plots can be seen in Figure 37.

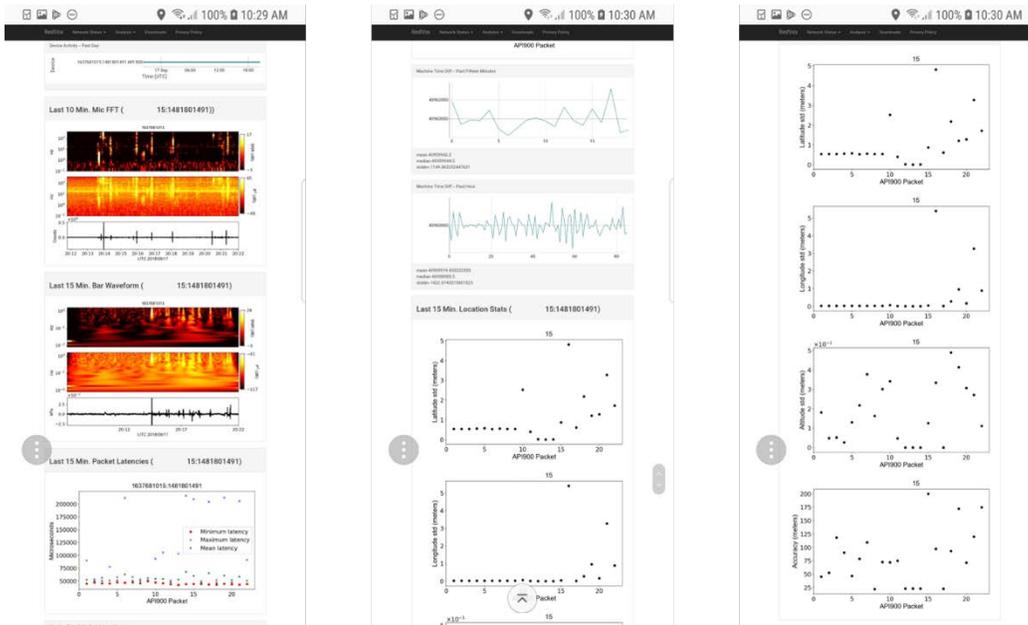


Figure 37: Overview of Plots from Device Details

- b. These plots can be saved to the device as a PNG file. Hold down on the image then tap Save Image.

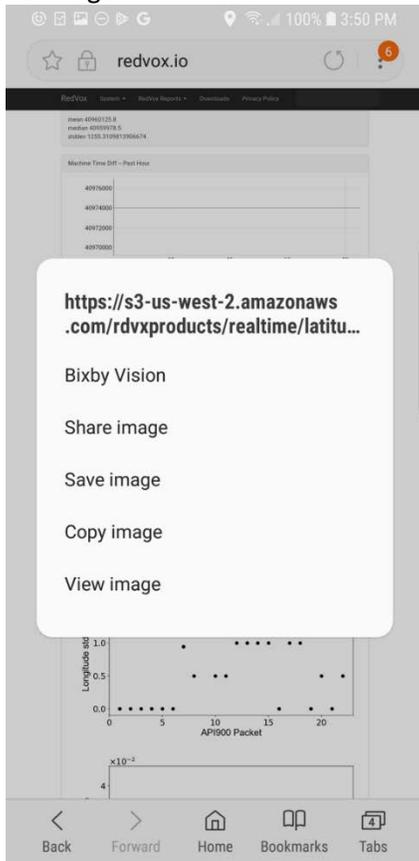


Figure 38: Saving Plots from Device Details

- c. Create a name for the image then tap Save or leave the default name and tap Save.

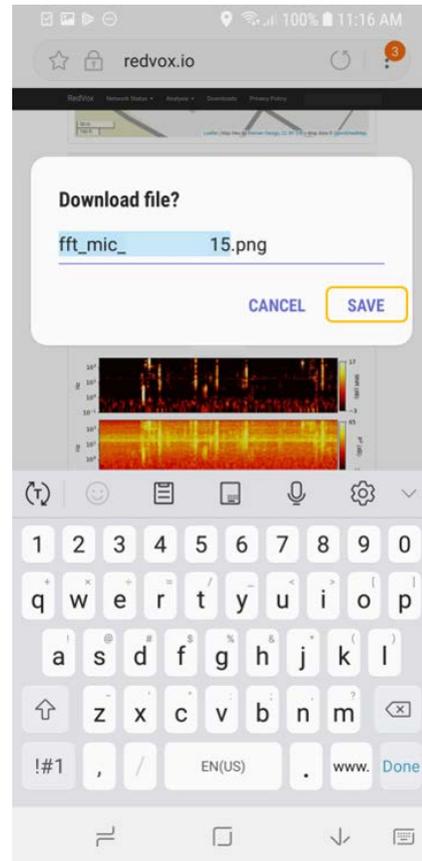


Figure 39: Save As

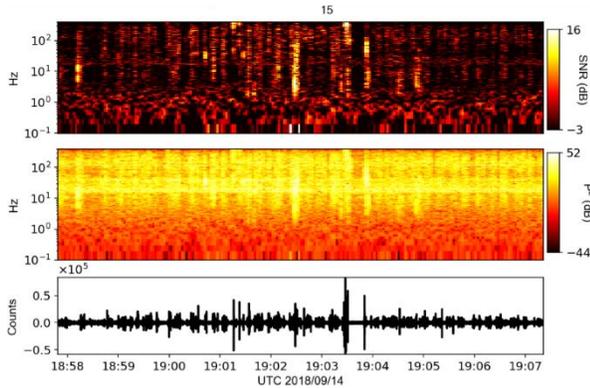


Figure 40: Spectrogram

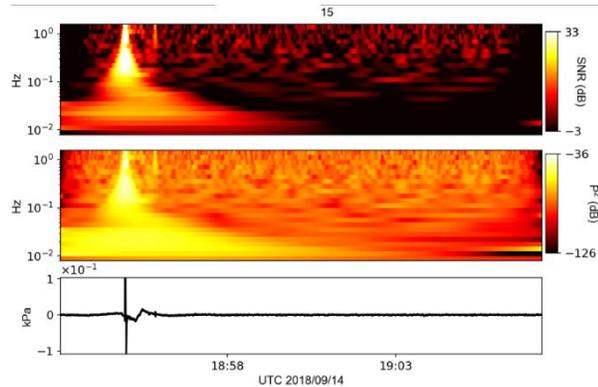


Figure 41: Scalogram

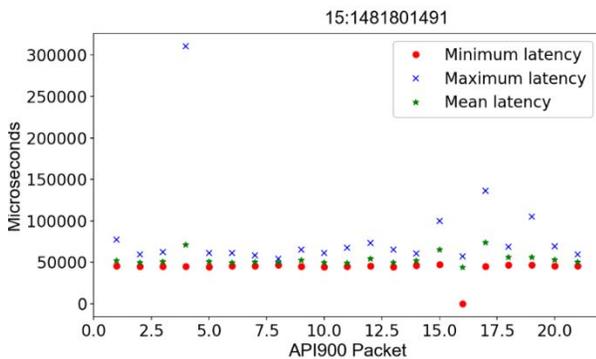


Figure 42: Latency Plot

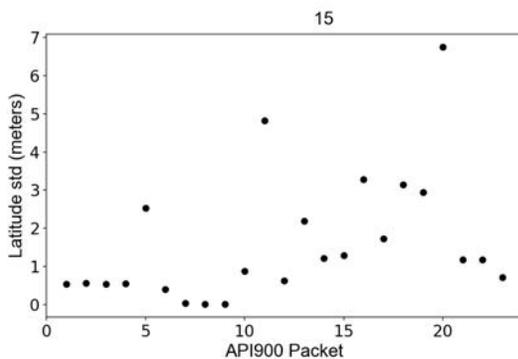


Figure 43: Latitude Plot

a. Spectrogram – These plots show the infrasound and acoustic data. The bottom panel shows the digital waveform over time. The middle panel graphs the sound intensity (in color) over time (x – axis) and frequency (y – axis). The upper plot is scaled as the signal to noise ratio so that the intensity color range can be enhanced.

b. Scalogram – These plots show the data collected for pressure from the barometer. The scalogram is used to see at what time was the signal the strongest. The plots are similar to how the spectrogram are with the lower panel scaled to emphasize the strongest signal, the middle panel creates the scalogram from the digital waveform shown in the third plot.

c. Latency plot – This plot shows the time difference between the server time and the device time (how long it takes for data to be moved from the device to Cloud storage). It shows the minimum, maximum, and average times differences for each packet.

d. Latitude plot – This plot shows the standard deviation of the latitude of the device averaged per data packet. This is a measure of the variability per packet.

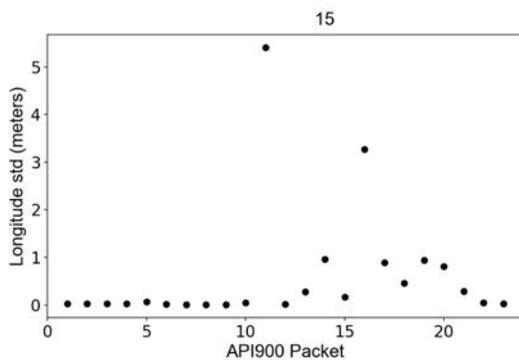


Figure 44: Longitude Plot

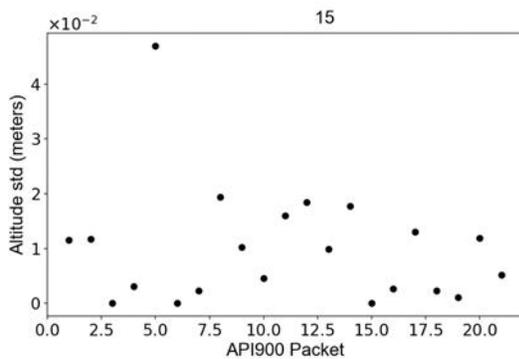


Figure 45: Altitude Plot

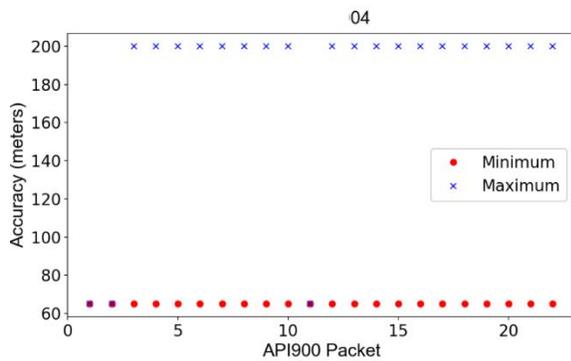


Figure 46: Accuracy Plot

e. Longitude plot – This plot is like the latitude plot, except It shows the standard deviation of longitude coordinates it gets for the device’s location averaged over a data packet.

f. Altitude plot – This graph estimates the standard deviation in the altitude values averaged per data packet, similar to how the longitude and latitude plots are generated.

g. Accuracy plot – This plot estimates the accuracy of the phone location in meters.

## 6.2 Data Explorer

1. Another way to access collected data is going to redvox.io > Network Status > Data Explorer. The Data Explorer is easier to view on a computer.

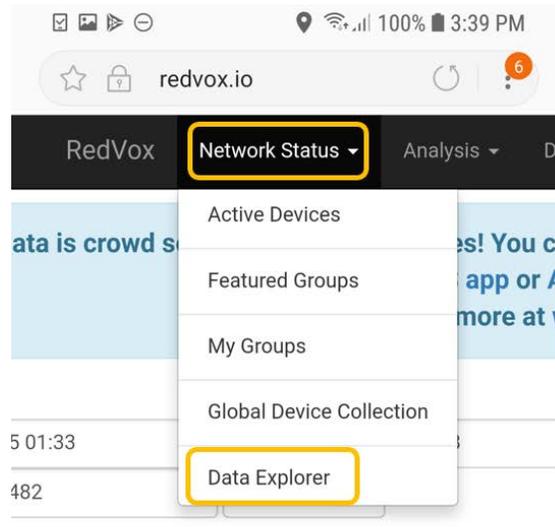


Figure 47: Data Explorer

2. There are three different colors: red – private, owned devices; yellow – public, owned devices; white – public devices. The list of devices looks like the figure below. Find the device that have been used to collect data.

A screenshot of the redvox.io website showing a table of device data packets. The table has columns for filename, ID:UUID, API, Email, Backfilled?, Private?, Scrambled?, and Make. The first row is highlighted in yellow, and the second row is highlighted in red. The table is titled 'Data Packet' and includes buttons for 'Show / Hide Filters' and 'Update'.

Filename	ID:UUID	API	Email	Backfilled?	Private?	Scrambled?	Make
api900/2018/09/26/163	414.rdvxz 16	530 900	redvox	false	true	false	
api900/2018/09/26/148	101.rdvxz 14	093 900	redvox	false	true	false	

Figure 48: Data Packet

- a. The list of devices has different columns. The columns are explained below. All timestamps are in microseconds referenced to 0 UTC of 1 January 1970 (Unix time, also referred to as Epoch in geophysics).
  - **Filename** – Gives the format/date/name of the RedVox file
  - **ID:UUID** – Provides the user with the device ID and the UUID of the device
  - **API** – Application Programming Interface
  - **Email** – Email used for RedVox account
  - **Backfilled?** – Was the packet backfilled? (The packet was not sent once it was completed and it was sent at a later time)
  - **Private?** – Is the data being published as private?
  - **Scrambled?** – Is the audio speech band scrambled?
  - **Make** – The make/brand of the device

- **Model** – The model of the device (i.e. Galaxy S8)
- **OS** – Operating system on the device
- **OS Version** – Operating system version on the device
- **App Version** – Version of the app on the device
- **Data URL** – Data server URL
- **Synch URL** – Time synchronization server
- **Auth URL** – The URL that was used to authenticate the device that this packet came from
- **App Epoch** – The timestamp on the packet using the device’s clock time
- **App Mach** – The timestamp on the packet using the device’s machine time
- **Server Epoch** – The timestamp on the packet at the time it arrived to the acquisition server
- **Bat. %** – Charge of the battery, given in percentage of the device
- **Temp. C** – Temperature of the device given in degrees Celsius
- **#ECh** – Number of evenly sample channels contained in the packet
- **#UECh** – Number of unevenly sampled channels contained in the packet
- **Auth Token** - The json web token. Scrambled at the server.
- **Firestore Token** – Self explanatory.

3. Find the device and click it. A list of sensor channels will appear on the page.

Type	Channel	Sensor	Fs	Timestamp 1st Sample	Payload	Payload#	Timestamps#
Even	MICROPHONE	I/INTERNAL MIC	800	1537994104261012	int32Payload	32768	N/A
Uneven	TIME_SYNCHRONIZATION		0	N/A	int64Payload	42	0
Uneven	MAGNETOMETER_X	AK09916C Magnetometer	200013.48529411765	N/A	float64Payload	205	205
Uneven	MAGNETOMETER_Y	AK09916C Magnetometer	200013.48529411765	N/A	float64Payload	205	205

Figure 49: Sensor Channels

- a. The information given for the sensor channel can be seen below:
- **Type** – Shows the even (constant sample rate) and uneven (varied sample rate) channels
  - **Channel** – Displays the type of channel that is in the row
  - **Sensor** – Physical sensor inside of the device
  - **Fs** – Sample rate (samples/second)
  - **Timestamp 1st Sample** – Unix time of the first sample taken
  - **Payload** – Type of payload/value of data
  - **Payload#** – How many values of data was collected
  - **Timestamps#** - Number of timestamps taken
  - **MeanV** – Mean of the payload values
  - **MedianV** – Median of the payload values
  - **MeanFs** – Mean value of the uneven channels
  - **StdFs** – Standard deviation of the uneven channels
  - **MedianFs** – Median value of the uneven channels

b. Click on sensor channel and a physical waveform will appear and the different values at each timestamp.

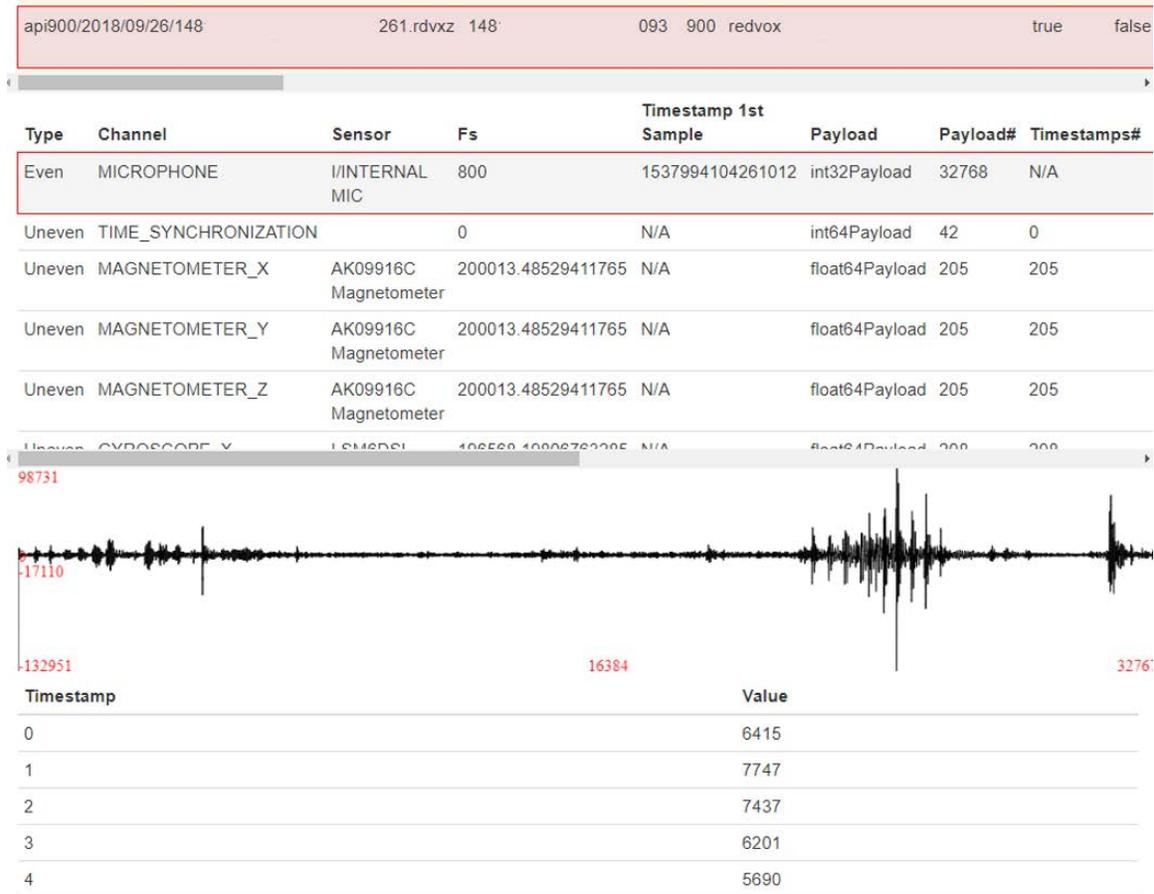


Figure 50: Microphone Data

### 6.3 Generate RedVox Report

1. Generating a RedVox report is recommended on a computer. Go to redvox.io > Analysis (drop down) > Generate RedVox Report.
2. It will redirect to the following page with instructions. Follow the instructions and fill out the areas.

Ad-Hoc Report Generation Instructions

- 1) Select an event origin time (UTC)
- 2) Select the relative number of minutes before the event origin time
- 3) Select the relative number of minutes after the event origin time
- 4) Select the event source origin using predefined values in the dropdown list, or select the location on the map, or enter the lat/lng manually
- 5) Select the height of the event source origin in meters
- 6) Click the "Update Stations" button to display stations available during the previously selected time range
- 7) Select product types that will be produced for this report
- 8) Select stations for which reports will be generated for (stations listed beside map)
- 9) Click "Create Report"

**Steps 1-3) Event Origin Time (UTC)**

10    0    2018-09-26 22:49:13    10    0

**Steps 4-6) Event source. Either select from pre-populated list or enter event origin location manually**

Select from pre-populated list of event origins

Choose Event Origin Location

or set event origin location manually

19.728373    -156.059216    0    Distance    Update Stations

**Step 7) Available report product types**

Micropho FFT    Microphone Multires    Barometer Waveform    Barometer Multires    Latency    Latitude Std    Longitude Std    Altitude Std    Accuracy Std    Magnetometer

Generate Report   Download Raw Data   Group Visible Devices

3. After filling out the fields, click on Update Stations then select the device(s) the report would be for.

**Step 8) Stations to include**

<input type="checkbox"/> Device	Distance	Arrival	Azimuth
<input type="checkbox"/> 1637	214 0km	+0s	60.5°
<input type="checkbox"/> 1637	371 0km	+0s	59.6°
<input type="checkbox"/> 1637	296 0km	+0s	173.9°
<input type="checkbox"/> 1637	296 0km	+0s	58.0°
<input type="checkbox"/> 1637	899 0km	+0s	168.6°
<input type="checkbox"/> 1637	13 0km	+0s	170.2°
<input type="checkbox"/> 1637	265 0km	+0s	172.3°
<input type="checkbox"/> 1637	50 0km	+0s	45.8°
<input type="checkbox"/> 1637	18 0km	+0s	65.6°
<input type="checkbox"/> 1637	10 0km	+0s	178.4°

Figure 51: Selecting Devices for RedVox Report

4. Once all the device(s) have been selected, click on Generate Report. A progress bar will show up on the top of the screen to tell the user how much the report was generated and show which part of the report is being generated. The figure below shows what the progress bar will look like.

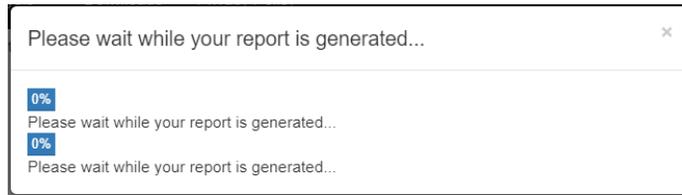


Figure 52: Progress Bar

5. The report that is generated will look like the one below.

RedVox Report	
Report Id	6420e8cae762478f89cf05ee7942a23e
Created On	Wed Sep 26 23:59:07 UTC 2018
Event Origin Time UTC	2018-09-26T22:49:13Z <b>Seconds from the Epoch UTC: 1538002153</b>
Report Start UTC	2018-09-26T22:39:13Z <b>Seconds from the Epoch UTC: 1538001553</b>
Report End UTC	2018-09-26T22:59:13Z <b>Seconds from the Epoch UTC: 1538002753</b>
Event Origin Location	19.728373, -156.059216
Event Origin Height Meters	0.00 meters
Report Owner	redvox
Only Visible to Owner?	false
Report Publicly Listed?	false
Device	1637      093 <b>Distance to Event Origin Kilometers: 0.02</b> <b>Back Azimuth to Event Origin: 171.83°</b>
Download Report Data	<a href="#">Download</a>

Figure 53: RedVox Report

- Edit Report Metadata** allows the user to edit the metadata associated with the report. The report title, URLs, plot descriptions and titles can be edited with this feature.
- The report can be rerun with more devices or different sensor channels or at different times. Click on **Rerun Report**.
- Sanitize Report** removes almost all sensitive information. It removes device IDs, locations, origin locations, and date/time information.
- Print View** turns the page into a printable version without buttons, Redvox.io navigation bar, etc.
- Download**. The user can download the raw data used for the report. Go to Download Report Data > click Download.
  - To read the data, use the Python SDK or the API900 specifications.
- Scrolling down this page will show different plots for the sensor channels that were selected. Similar to the Device > Details, the plots can be saved to the computer or device viewing the page. Right click on the plot > Save image as.

## 6.4 Retrieving Files from Devices

The following sections will demonstrate how to access RedVox files from a couple Android devices.

### 6.4.1 Samsung Galaxy S8 Example

1. For a Samsung Galaxy S8, go to My Files.

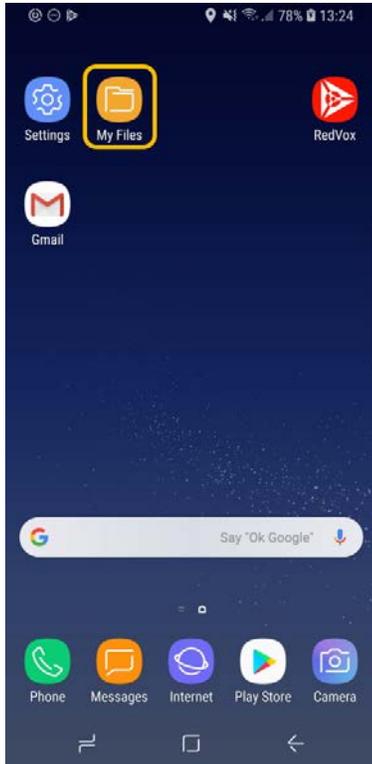


Figure 54: Go to My Files

2. In My Files > Internal Storage. My Files should look the figure below.

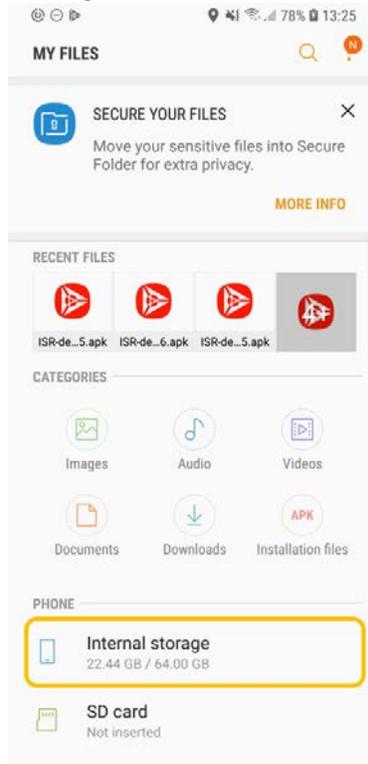


Figure 55: My Files > Internal storage

3. In Internal Storage > RDVX. The folders are organized alphabetically.

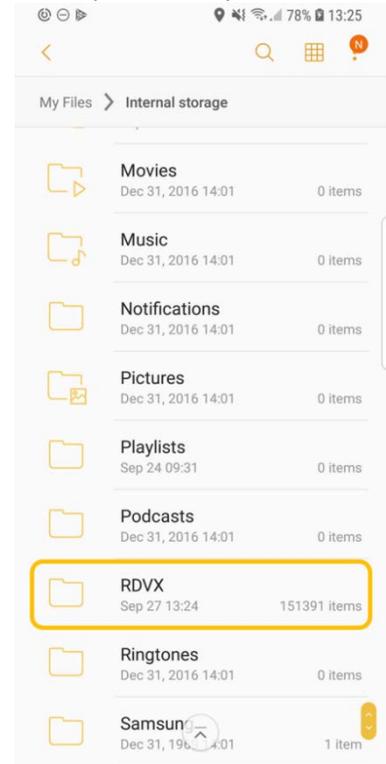


Figure 56: My Files > Internal storage > RDVX

4. The files that are obtained from the phone can be emailed to be accessed on a computer. This is not recommended.
5. A faster and more secure way to access the RDVX files is connecting the device to the computer.
6. Go to Settings > Developer Options > USB Configuration. Set the USB configuration on the device to Media Transfer Protocol (MTP).

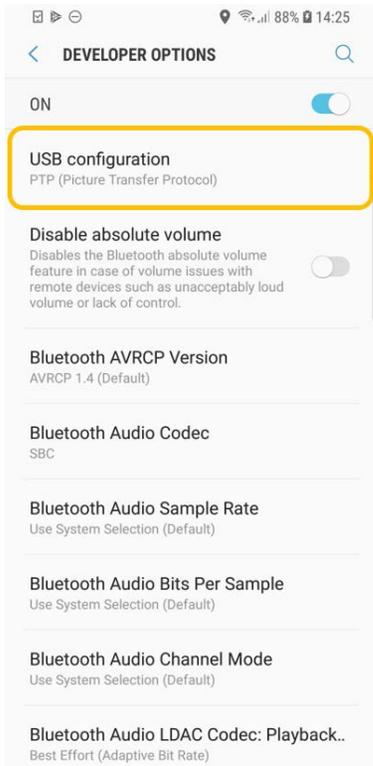


Figure 57: USB Configuration Setting

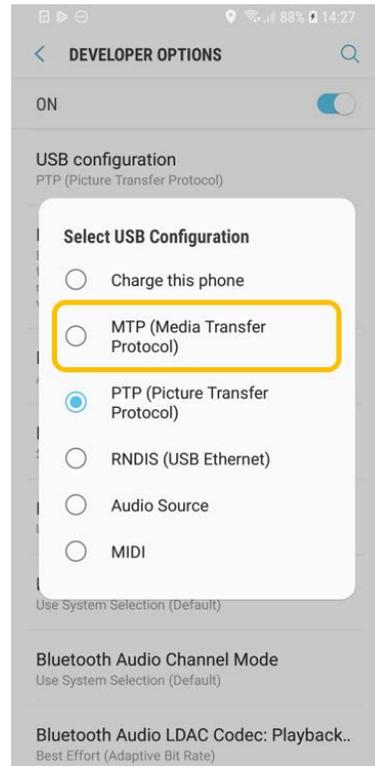


Figure 58: Picture Transfer Protocol

7. Go to File Explorer > Galaxy S8 > Phone.

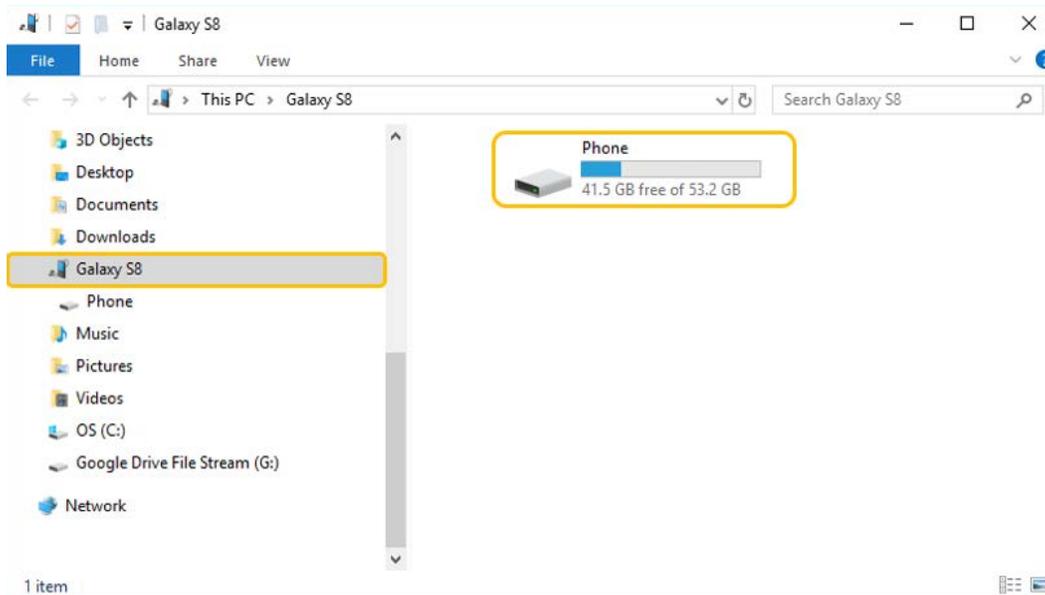


Figure 59: File Explorer

8. Find the RDVX folder.

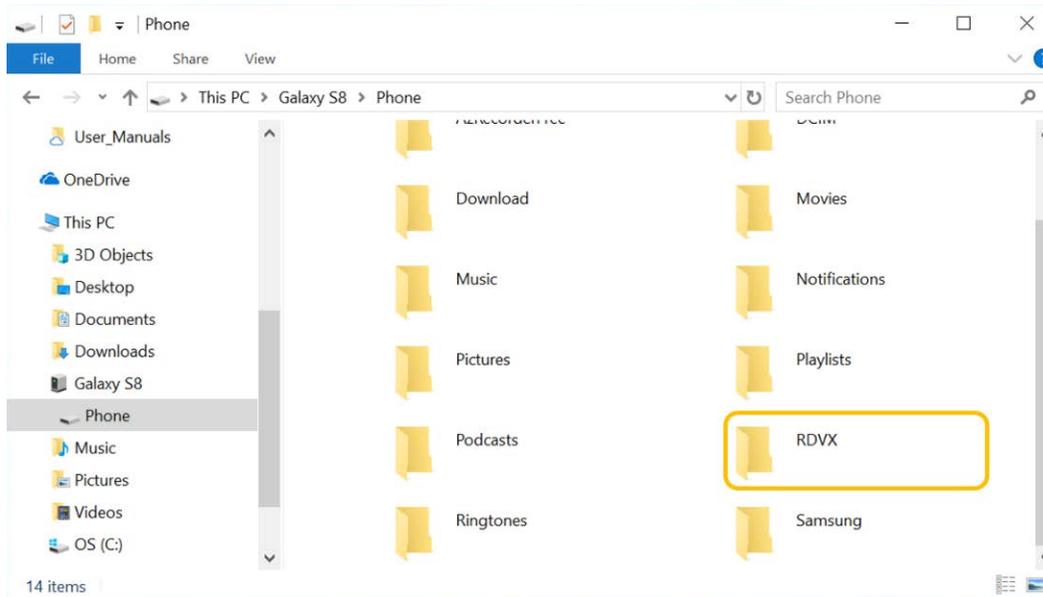


Figure 60: RDVX Folder on Phone

9. This folder contains all of the RDVX files from the RedVox app. Copy and/or download these files to the computer.
10. Create a folder dedicated to RDVX files.

## 6.4.2 Google Pixel 2 Example

### 1. Go to Settings.



Figure 61: Settings

### 2. Go to Settings > Storage.

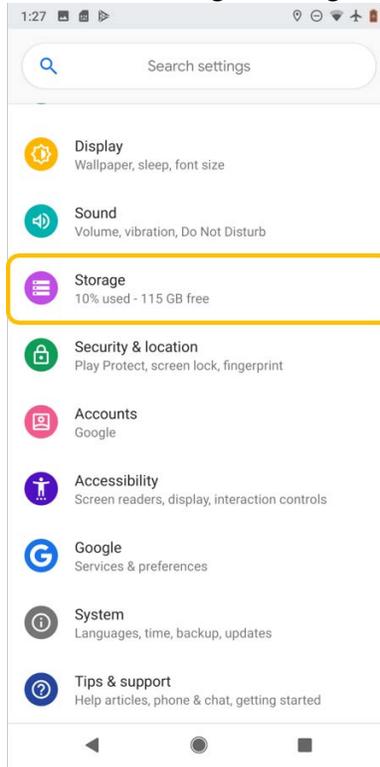


Figure 62: Settings > Storage

### 3. Go to Storage > Files.

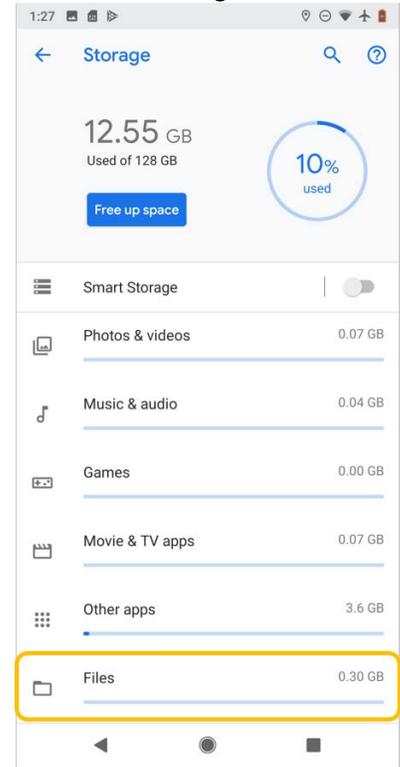


Figure 63: Storage > Files

### 4. In Files, it will show all the internal files that are saved on the device. Look for the RDVX folder.

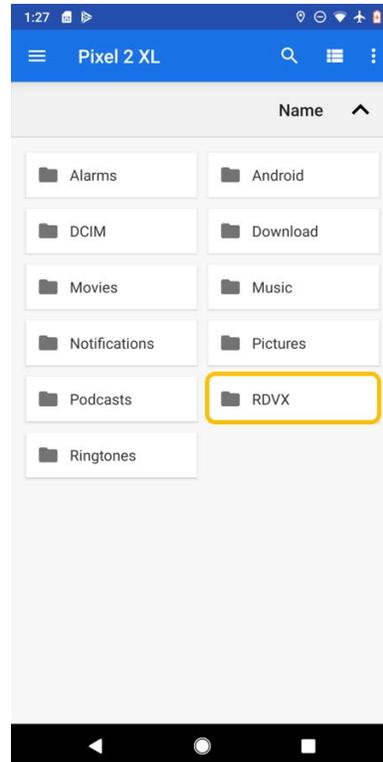


Figure 64: Files > RDVX

5. Go to System > Advanced > Developer options > Default USB configuration.

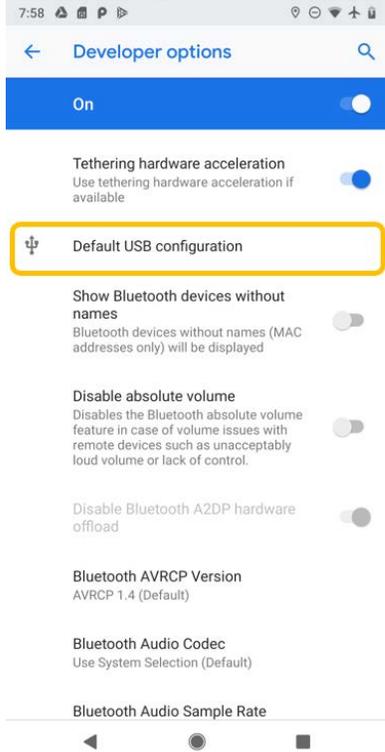


Figure 65: USB Configuration

6. In order to have files viewable on the computer, change the USB configuration to File Transfer.

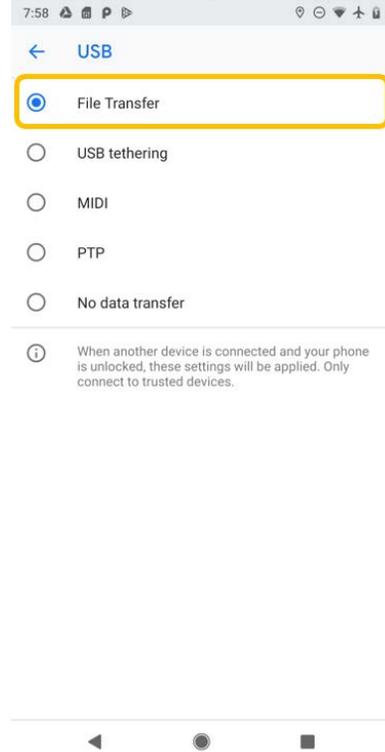


Figure 66: USB Configuration Options

7. Connect the device to the computer.
8. Open File Explorer.
9. Go to Pixel 2 > Internal shared storage.

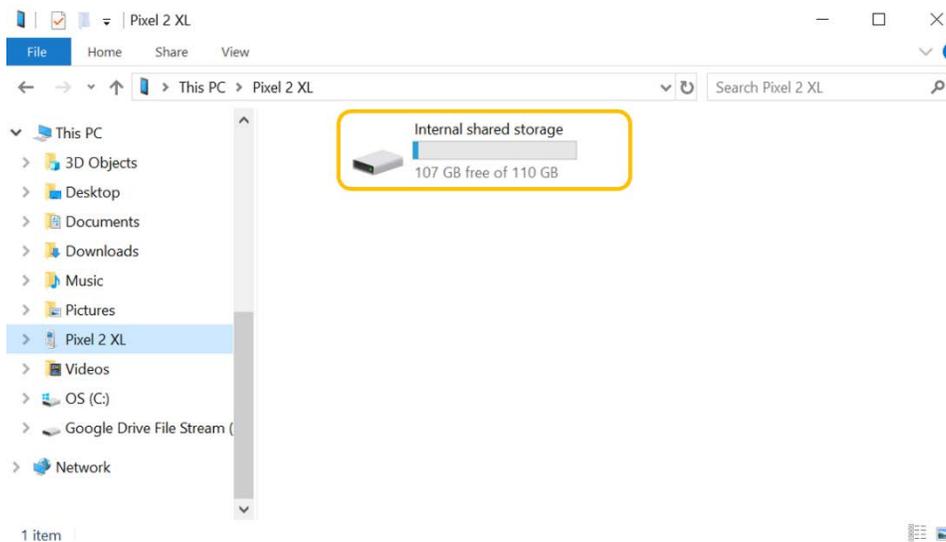


Figure 67: Pixel 2 Internal shared storage

10. Look for the RDVX folder.

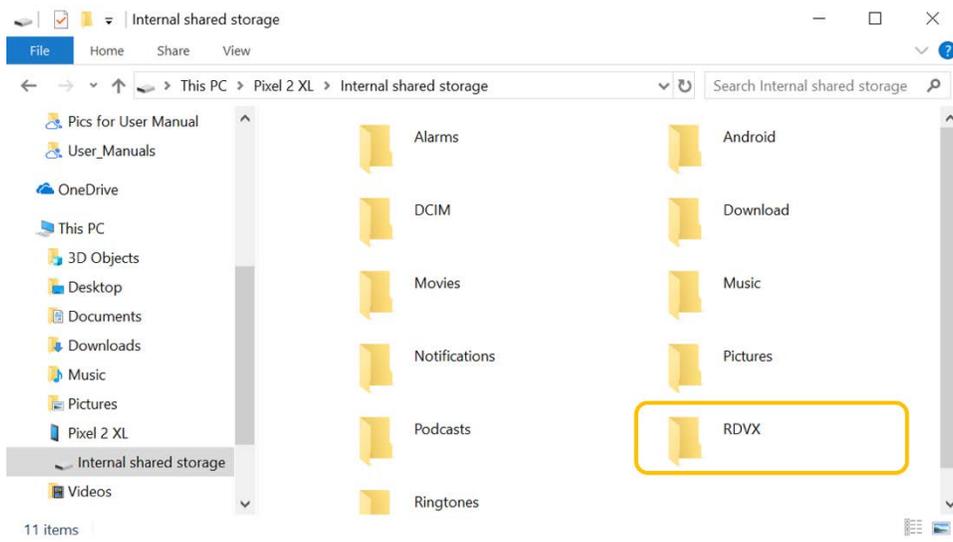


Figure 68: Pixel 2 RDVX Folder

11. This folder contains all of the RDVX files from the RedVox app. Copy and/or download these files to the computer.
12. Create a folder dedicated to RDVX files.

## 7 Installing Python

If you are already using Python 3.6 or higher and a preferred IDE, you do not need this section. If you are new to Python and want to start fresh, we show how to install Anaconda, the required RedVox libraries and Python Software Developer Kit (SDK) for Application Programming Interface (API) 900. Please refer to:

<https://pypi.org/project/redvox/>

<https://redvox.io/downloads>

### 7.1 Installing Python on a Mac Laptop

1. Download and install the latest [Anaconda](#) base that matches the computer's operating system (Mac).



Figure 69: Anaconda Webpage

2. Open Terminal.
3. Find where Python and iPython is located in the computer's folders and what version of Python is downloaded on the computer. Enter the following commands in the Terminal.

```
which python
which ipython
python --version
```

4. Change the directory to anaconda3.

```
cd Location
ls
cd anaconda3/
ls
```

5. Once the directory is changed to anaconda3, install the following packages: lz4 and protobuf.

```
conda install lz4
conda install protobuf
```

6. Once both packages have been installed, install the RedVox reader.

```
pip install redvox
```

## 7.2 Installing Python on a Windows Computer

1. Download and install the latest [Anaconda](#) base that matches the computer's operating system (Windows).



Figure 70: Anaconda Webpage

2. Open Anaconda Prompt. Go to Windows menu > Anaconda3 > Anaconda Prompt.

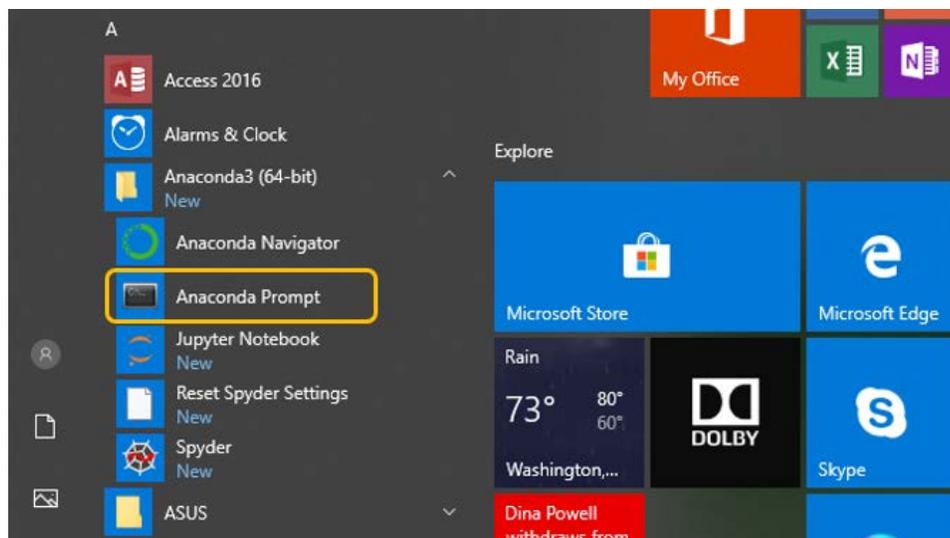


Figure 71: Anaconda Prompt

3. The “where” command will print the path of the following programs: python and conda. The “version” command will print which version python and conda currently are. This will also verify that these programs have been installed.

```
where python
where conda
python --version
conda -version
```

4. In the Anaconda Prompt, change the directory to the folder Anaconda3/. Command “dir” will list out the different directories, and “cd” will change directory.

```
cd Anaconda3/
```

- [REDACTED]
5. Once the directory is changed to Anaconda3/, install the following packages: lz4 and protobuf.

```
conda install lz4  
conda install protobuf
```

6. Once the two packages have been installed, install the RedVox reader.

```
pip install redvox
```

- a. If necessary update the reader with the following command:

```
python -m pip install --upgrade pip
```

## 8 Opening Jupyter Notebook and Reading RDVX Files

1. Jupyter Notebook is provided with the Anaconda download. Open the Jupyter Notebook by entering the following commands. This command will open the Jupyter Notebook in a web browser.

```
cd Documents/  
jupyter notebook
```

2. Once the Jupyter Notebook is open, use the following code or another code to load RedVox data into the notebook.

```
import os # operating system  
from redvox.api900 import reader # calling the reader from Redvox package  
  
path = '/Users/User/folder/api900/2018/10/01/' # Location of the folder  
files = os.listdir(path) # List the files in the folder  
print(files) # print the list of files in the folder  
  
firstfile = files[0] # assign the first variable name, firstfile  
print(firstfile) # print the file name of the first file  
print(path + firstfile) # print the location of the .rdvx file  
  
readfile = reader.read_file(path + firstfile) # assign file path to readfile  
  
packet = reader.wrap(readfile) # filter the data in the .rdvx file  
print(packet) # print metadata
```