

Raspberry Pi for HAM Radio Part 1



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Ver 1.2, 4/09/2020



1.1 Introduction

Since 2012, the Raspberry Pi nano computer has become an increasingly important part of the DIY and "maker" community. The increase in power of the Raspberry Pi over the years offers very interesting possibilities for radio amateurs. Indeed it allows not to permanently monopolize a PC in the decoding of frames with software like WSJT-X, FLDIGI, etc..., without forgetting the possibility to control the Raspberry Pi remotely and thus to be able to work outside the radio shack as I can sometimes do on my couch. Moreover, this nano computer is now widely used in any Hotspot (DMR or D-STAR).

So why in a club, so few OM use this tool?

I have often asked myself this question and I think it comes from the use of the operating system (OS). When you power on a Raspberry PI, the OS, called Raspbian is stored on a microSD card. This is a Linux distribution specially designed for the Raspberry.

When you want to install a software under Linux, it is no longer a matter of double clicking on a downloaded file like "setup.exe" like under Windows. Indeed, it is often necessary to use the console and thus type "command lines" to install or configure a program. This can seem off-putting and frankly very tedious. We are so used to using a graphical environment that we feel like we are back to the early 80's micro-computing.

However, the mastery of some basic commands in Linux console allows us to consider the installation of different programs and hardware such as:

- WSJT-X
- FLDIGI
- QSSTV
- DIREWOLF (APRS)
- SDR receivers (rtl-sdr, Lime SDR, SDRplay, Airspy, etc.)
- **GNU-RADIO** -
- ADS-B Décoding
- Programming
- Etc. _

In the appendix on page 21, the main characteristics of the Raspberry Pi.



1.2 Required material

There are many kits containing the Raspberry PI with a case, an mSD card and a power supply from resellers such as https://www.elektor.fr , https://www.kubii.fr/40-les-cartes-raspberry-pi or amazon

It will be necessary to pay attention to the choice of the power supply: 2 Amperes mini for a Raspberry Pi 3 and 3 Amperes for the Raspberry Pi 4.





If the power supply current is too low, a yellow lightning flash will appear in the upper right corner of the screen when the power is turned on. For projects requiring few resources (PiAware) and a power supply on battery and solar panel, the Raspberry pi zero W is a good compromise with a consumption of 160mA. However, the network connection will be done by WIFI.







1.3 Preparation of the operating system

With your Computer, download the new Pi Imager operating system management utility for the Raspberry PI. <u>https://www.raspberrypi.org/downloads/</u>



After downloading and installing, select the Raspbian with Raspberry Pi Desktop OS.

🕉 Raspberry Pi Image	er v1.2	
	Operating System	x
Š	Raspbian A port of Debian with the Raspberry Pi Desktop (Recommended) Released: 2020-02-13 Cached on your computer	
8	Raspbian (other) Other Raspbian based images	>
	LibreELEC A Kodi Entertainment Center distribution	>
0	Ubuntu Choose from Ubuntu Core and Server images	>
٩	Misc utility images	>



Tutorial

Insert the micro Sd card into a USB reader on the PC, select the SD card reader here GENERIC USB Reader, then click on WRITE.



The Pi Imager utility will automatically download and copy the selected operating system to the mSd card. The time of the operation depends on the Internet connection, you have to be patient.

1.4 Power on RPI

Carry out the following wiring, ending with the 5V power supply of the Raspberry.



By default, the language at startup is English, a configuration window appears in order to configure the user's country. (for me in French)



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Welcome window aft	er startup	Select yo	our language	
Welcome to	Raspberry Pi 🛛 🗸 🔺		Welcome to Raspberry Pi	↓ ∧ ×
	0	Set Country		
li l	ð.	Enter the detail	ls of your location. This is used to a	set the language,
Q.	y	ume zone, key		igs.
Welcome to the Raspberry Pi Desk	(top!	Country:	France	•
Before you start using it, there are	a few things to set up.	Timezone:	Paris	•
Press 'Next' to get started		TIMEZONE.	Use English language	Use US keyboard
These Heat to get started.		Press 'Next' w	hen vou have made vour selection	
Canaal	IP : 192.168.1.55	Back	ien you nuve mude your beledion.	Next
Cancer	Next	Buok		Hoxe
Change Password		Enhance	s the image if there is	s a black
(I have kept the same	e one for practical	border ar	ound the screen.	
reasons in this docur	nent)			
Welcome to	Raspberry Pi 🔹 🗸 🗙		Welcome to Raspberry Pi	✓ ∧ ×
Change Password		Set Up Scree	n	
The default 'pi' user account curren	ntly has the password 'raspberry'.	The desktop s	should fill the entire screen.	
password that only you know.	ou change this to a different	lick the box i	Delow IT your screen has a black b	order at the edges.
Enter new password:	raspberry	✓ This scree	en shows a black border around th	ne desktop
Confirm new password:	raspberry	Press 'Next' to	o save your setting.	
	Hide characters	The change u	vill take offect when the Di is resta	utad
Press 'Next' to activate your new p	assword.	The change v	hin take effect when the PLIS resta	nted.
Back	Nevt			
Back	Next	Back		Next
Setting up a WIFI cor	nnection (optional)	Updating	is recommended	
Welcome to F	Raspberry Pi 🔹 🗸 🗙		Welcome to Raspberry Pi	~ ^ X
Select WiFi Network		Update Softw	/are	
Select your WiFi network from the li	ist.	The operating	system and applications will nov	v be checked and
Bbox-CA4B8E62	1 🔋	updated if neo	cessary. This may involve a large o	download.
Livebox-0E00	â 😤	Press 'Next' to	check and update software, or 'S	kip' to continue
orange	() •	without check	ung.	
wifijohan	1 •			
Press 'Next' to connect or 'Skin' to	continue without connecting			
Back	Skin Nevt		20000000	
Duon	onp next	Back	5	Skip Next

Download	Update completed
Welcome to Raspberry Pi 🛛 🗸 🔺 🗙	Welcome to Raspberry Pi 🔷 🥆 🗙
Update Software	Update Software
The operating system and applications will now be checked and updated if necessary. This may involve a large download.	The operating system and applications will now be checked and updated if necessary. This may involve a large download.
Press 'Nex Downloading updates - please wait inue	Press 'Nex System is up to date inue without ch
	ОК
Back Skip Next	Back Next
A restart is necessary	The menu is now in French
A restart is necessary Welcome to Raspberry Pi ~ ^ ×	The menu is now in French
A restart is necessary Welcome to Raspberry Pi ~ ~ × Setup Complete	The menu is now in French
A restart is necessary Welcome to Raspberry Pi Setup Complete Your Raspberry Pi is now set up and ready to go.	The menu is now in French
Welcome to Raspberry Pi × Setup Complete Your Raspberry Pi is now set up and ready to go. Press 'Restart' to restart your Pi so the new settings will take effect. 	The menu is now in French
A restart is necessary Welcome to Raspberry Pi < <	The menu is now in French Image: Son et vidéo
A restart is necessary Welcome to Raspberry Pi	The menu is now in French Image: Solution of the second

1.5 Find the IP address of my Raspberry Pi

In many applications, it is necessary to know the IP address of your Raspberry PI connected to the network, for example to connect remotely, to perform maintenance operations.

For the 1st power on, a screen is necessary. But once the Raspberry Pi is configured, there will be no need for a screen, keyboard or mouse. The management will be done using your usual PC.





Note :

eth0 corresponds to the wired interface by Ethernet cable ; **Io**: is the IP address of the local loop always 127.0.0.1; wlan0: is the WIFI interface.







1.6 Take control of the Raspberry Pi remotely with a PC

It is not necessarily necessary to have an additional monitor for the Raspberry PI. Most of the time, especially for the command lines, I only use the console. For this, there is only the power supply and the Ethernet cable connected to the Raspberry PI.

1.6.1 SSH and VNC

By default, the connection is disabled. To enable these options, go to the Configuration menu of the Raspberry PI. Follow steps 1 to 4.



1.6.2 Putty

Download and install putty https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html



In the Translation menu, check the UTF-8 character set, disable the keypad mode application, set the keyboard to Linux. This configuration allows to use the keypad.



Type the IP address of the RPI in SSH, then Open : steps (1 to 3)

RuTTY Configuration	? ×
Category: Session Cogging Terminal Keyboard Bell Features Window Appearance Behaviour Translation Selection Colours Connection Proxy Telnet Rlogin E-SSH	Basic options for your PuTTY session Specify the destination you want to connect to Host Name (or IP address) Port 192.168.1.55 2 22 Connection type: Raw Telnet Rlogin SSH Serial Load, save or delete a stored session Saved Sessions rpi Default Settings cnc led esp npr pluto-sdr serial pluto-sdr serial pluto-sdr serial pluto-sdr serial pluto -sdr serial Port Concelled esp npr Pluto -sdr serial Pluto -sdr se
Serial	Close window on exit:
About Help	Open Cancel

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Enter the login and password entered during configuration on page 6.

	Login :	рі			
	Password :	raspberry			
			_		
pi@raspberrypi: ~					x
gin as: pi pi @192.168.1.55's password .nux raspberrypi 4.19.97-	: raspberry v7+ #1294 SMP Th	u Jan 30 13:15:5	58 GMT 2020	armv71	
e programs included with e exact distribution ter dividual files in /usr/s	the Debian GNU/ ms for each prog hare/doc/*/copyr	'Linux system are gram are describe right.	e free soft ed in the	ware;	
bian GNU/Linux comes wit rmitted by applicable la st login: Sat May 912:	h ABSOLUTELY NO w. 19:46 2020	WARRANTY, to the	e extent		
H is enabled and the def	ault password fo please login as	or the 'pi' user the 'pi' user ar	has not been d type 'pas	en changed sawd' to s	l. et

The command prompt appears as before with LXTerminal

1.6.3 WinSCP

a new password.

i@raspberrypi:~ \$

WinSCP is a utility that installs in a PC to access the files of the Raspberry PI Download and install WinSCP <u>https://winscp.net/eng/download.php</u>

DOWNLOAD WINSCP 5.17.5 (10.6 MB)

Your download of WinSCP-5.17.5-Setup.exe will start shortly...



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Follow steps (1 to 6) to connect to the Raspberry Pi

password: raspberry

🛃 Login			Mot de passe - rpi
Nouveau Site	Session Protocole de fichier SCP 1 Nom d'hôte 192.168.1.55 Nom d'utilisateur pi 3 Sauver Annuler 4	Numéro de port 22 💌 e Avancé 🔽	Recherche de l'hôte Connexion à l'hôte Authentification Utilisation du nom d'utilisateur "pi". Mot de passe : •••••••• 6 7 OK Annuler Aide
Outils Gestionnaire Image: Afficher la boîte de dialogue de connexion	Connexion ▼ Fermer on au démarrage et à la fermeture de la dernière s	Aide	

To copy the files, simply move them with the mouse between the 2 PC and RPI explorer windows. (The user directory of the RPI is /home/pi)



VNC is a system for visualizing and controlling the desktop environment of a remote computer. It allows the VNC client software to transmit keyboard and mouse input information to the remote computer with VNC server software across a computer

network.https://www.realvnc.com/fr/connect/download/viewer/

Download and install VncViewer					
Téléchargez VNC Viewer sur l'appareil depuis lequel vous souhaitez exercer le					
contrôle à	distance.				
📫 🛋 🦄 👪 ios					
Windows macOS Linux Raspberry Pi iOS	Android Chrome Solaris HP-UX AIX				
Télécharger	VNC Viewer				
When starting VNC Viewer, you have to	V2 VNC Viewer				
create a new connection	Fichier Afficher Aide Nouvelle connexion Ctrl+N				
	Ouvrir une session				
	Renommer F2				
	Supprimer				
	Dupliquer Ctrl+D Propriétés Alt+Enter				
	Importer connexions				
	Exporter connexions				
	Préférences				
	Quitter				
Fill in the IP address of the raspberry.	🔽 rpi - Propriétés				
	Général Options Expert				
	E				
	VNC Server 192168155				
	Nom : mi				
	Étiquettes				
	OK				
Right click then Login	V2 VNC Viewer				
	Fichier Afficher Aide				
	rpi				
	Renommer F2				
	Supprimer				
	Dupliquer Ctrl+D Propriétés Alt+Enter				
	roprecom Anterenter				



Tutorial

Re-enter the usual login and password.

The icons at the top of the window are used to configure the VNC viewer and modify the image quality. No more need for a monitor connected to the RPI.

ſ	V2 Authentification		x	
	VNC Server:	192.168.1.55::5900		
	Nom d'utilisateur :	pi		
	Mot de passe :	•••••		
	Mémoriser le mo	ot de passe		
	Alias :	Heroic trapeze mystery.	Pyramid single Simon.	
	Signature :	7c-fc-ac-94-84-4b-55-69		
			OK Annuler	



If necessary, change the resolution by going to the RPI configuration menu.

🚖 Préférences	🚍 Préférences 🔹 😽 Configuration du Raspberry Pi					
1	Configuration du Raspberry Pi			~ ^ X		
Système	Display	Interfaces	Performance	Localisation		
Resolution:	2				Set Resoluti	on
Overscan:			 Active 	é	 Désactive 	é 3
Pixel Doubling:			 Active 	é	 Désactive 	é
Screen Blankin	3lanking: Activé Désactivé 		é			
Set Resolution 🗸 🔺 🗙						
Resolution: DMT mode 82 1920x1080 60Hz 16:9 - 4						
			Annuler	Valider		
5						
					Annuler	Valider

In the case of the Raspberry PI 4, the set resolution option is absent. It is then necessary to go to the Screen Configuration menu and choose its resolution.



Don't forget to validate the resolution change



However, if there is no screen connected to the Raspberry PI 4 at startup, the following message may occur with VNC viewer:



From the Advanced Option menu, select the resolution you want.

pi@raspberrypi: ~ 🔹 🔹	× pi@raspberrypi:~ ~ × ^ ×
Fichier Édition Onglets Aide	Fichier Édition Onglets Aide
Raspberry Pi 4 Model B Rev 1.2 Raspberry Pi Software Configuration Tool (raspi-config)	Raspberry Pi Software Configuration Tool (raspi-config)
1 Change User Password Change password for the 'pi' user 2 Network Options Configure network settings 3 Boot Options Configure options for start-up 4 Localisation Options Set up language and regional settings to match your 5 Interfacing Options Configure connections to peripherals 6 Overclock Configure overclocking for your Pi 7 Advanced Options Configure advanced settings 8 Update Update this tool to the latest version 9 About raspi-config Information about this configuration tool	A1 Expand Filesystem Ensures that all of the SD card storage is available A2 Overscan You may need to configure overscan if black bars are A3 Memory Split Change the amount of memory made available to the GPU A4 Audio Force audio out through HDNI or 3.5mm jack A5 Resolution Set a specific screen resolution A6 Screen Blanking Enable/Disable screen blanking A7 Pixel Doubling Enable/Disable 2x2 pixel mapping A8 GL Driver Enable/Disable excompmgr composition manager AA Pi 4 Video Output Video output options for Pi 4 AB Overlay FS Enable/Disable read-only file system Enable/Disable read-only file system
<select> <finish></finish></select>	<select> <back></back></select>
	Pagnherry Bi Software Configuration Tool (rasnisconfig)
Choose screen resolution Default 720x480 DMT Mode 4 640x480 60Hz 4:3 DMT Mode 9 800x600 60Hz 4:3 DMT Mode 16 1024x768 60Hz 4:3 DMT Mode 85 1280x720 60Hz 16:9 DMT Mode 55 1260x1024 60Hz 5:4 DMT Mode 55 1600x1200 60Hz 16:9	I Change User Password Change password for the 'pi' user 2 Network Options Configure network settings 3 Boot Options Configure options for start-up 4 Localisation Options Set up language and regional settings to match your 5 Interfacing Options Configure connections to peripherals 6 Overclock Configure overclocking for your Fi 7 Advanced Options Configure advanced settings 8 Update Update this tool to the latest version 9 About raspi-config Information about this configuration tool
<ok> <annuler></annuler></ok>	<select> <select></select></select>
The resolution is set to DMT mode 82	Redémarrer la Raspberry.

It's thanks to this utility (VNC viewer) that I work with WSJT-X installed in the RPI from the couch.

It is important to be familiar with the utilities that will allow you to control the Raspberry remotely. In part 2, we will see how to install and use WSJT-X. In the appendix on page 19 some information about the command lines.



Never turn off the RPI abruptly by coupling the power, always use the graphic menu or command line.



Appendix 1 Console: command line

The basic commands will be reviewed in part 3:

Try in order (from left to right)

Lists the contents of the folder	Create a trial folder			
ls -1	mkdir essai			
Change folder (goes to the "essai" folder)	Going up from a folder			
cd essai	cd			
Creates a text file	Type a random text			
nano test	CTRL + O save file CTRL + X quit nano			
Displays the content of the test file	Lists again the contents of the folder			
cat test	ls -1			
Changes the access rights of the file	Lists again the contents of the folder			
chmod 777 test	ls -1			
Before chmod				
-rw-rr 1 pi pi 11 mars 30 16:05 test				
After Chmod				
-rwxrwxrwx 1 pi pi 11 mars 30 16:05 t	est			
Delete a file	Lists again the contents of the folder			
rm test	ls -1			

You can press the up arrow at any time to avoid retyping the command.

The RPI console, as on most Unix systems, offers auto-completion, i.e. with the TAB key you can complete what you type, this is very useful to navigate through the tree structure or to avoid typos!



Displays available memory	Displays the available space on the disk in bytes.s			
free	df /			
Displays connected USB devices				
lsusb				
Displays the ip address of the Raspberry PI				
ifconfig				
ip addr				
eth0 Link encap:Ethernet HWaddr b inet adr:192.168.1.12 Bcast:	8:27:eb:af:cd:48 192.168.1.255 Masque:255.255.255.0			
Displays file/folder type	Ping command			
Sort essai	ping 192.168.1.1			
Super user command, grants administrator	Command advanced packaging tool, for			
rights.	software installation.			
sudo	apt-get			
Displays the manual of the package manage	ement command, you can at any time display the			
manual of the different previous commands.				
man apt-get				
man ls				
man chmod				
etc				



Appendix 2

Few models of Raspberry PI:

Model	GPIO	Ethernet	WIFI	Bluetooth	USB2	USB3	RAM	CPU Clock
Pi-B	26	0	N	N	2	N	512MB	700 MHz
Pi-2B	40	0	N	N	4	N	1GB	900 MHz
Pi-3B	40	0	2.4 Ghz	0	4	N	1GB	1.2 Ghz
Pi-4B	40	Gigabits	2.4+5 Ghz	0	2	2	4GB(max)	1.5 Ghz
Pi-Zero-W	40	N	2.4 GHz	0	1	N	512MB	1 Ghz

Raspberry PI consumption in mA:

Model	Main board	HDMI & Ethernet	HDMI & Wifi	Max current available on USB ports
Pi-B	500	nc	nc	500
Pi-2B	180	290	nc	600 à 1200
Pi-3B+	390	490	520	1200
Pi-4B	560	680	710	1200
Pi-Zero-W	160	nc	180	Depending on the power supply





Raspberry Pi for HAM Radio Part 2



Prerequisite: HAM Radio tutorial with the Raspberry Pi Part 1

Summary:

Part 2 : Traffic software Installation FLDIGI, WSJT-X etc.

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2.3 Update repositories	P. 4
2.4 Transceiver connection	P. 5
2.4.1 RPI with an ICOM 7300	
2.4.2 RPI with an Elecraft KX3	
2.5 Connect a USB device to the Raspberry PI	P. 6
2.6 Sound card management	P. 7
2.7 CAT-System interface management	P. 9
2.8 Fldigi	P. 11
2.9 Wsjt-x	P. 14
2.10 JTDX	P. 17
2.11 JS8CALL	P. 18
2.12 Gridtracker	P. 19
2.13 cqrlog	P. 21
2.14 Qsstv	P. 21
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Version du 6/03/2021 V1.2

RPI part 2-V1.2.docx

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2.1 Introduction.

In this description, I tried to be as clear as possible with as many screenshots as possible. There are different possibilities to install a software on a Linux environment. For each radio utility installed, I chose what seems to me the easiest, limiting as much as possible the command lines for beginners.

As far as possible, I will try to keep this description up to date once a year, because the evolution of the Raspberry and the operating system requires constant modifications.

Installation always takes some time. Before any modifications or additions of programs, remember to save the mSD card so that you can go back very easily. Also think about the ferrite cores on the connection cables around the Raspberry Pi.

Having more and more free Open Source Radio utilities is really in the Radio Amateur spirit. I hope this document will make other OMs want to make detailed explanatory tutorials and not just a briefing note listing incomplete command lines in GitHub or in a blog.

2.2 Sauvegarde de la carte mSD.

Take advantage of a break or lunch to make a backup of the operating system (This operation can be done at any time)

- Insert a reader with its blank mSD card into a free USB port on the Raspberry PI.





Select the source and destination, then start the copy.





Tutorial

2.3 Update repositories

The sudo apt update command updates the list of files available in the APT repositories present in the configuration file /etc/apt/sources.list. Running this command regularly is a good practice, in order to keep your list of available packages up to date and hope to have the latest software versions. The same goes for the upgrade command to update obsolete packages.

sudo apt update sudo apt upgrade

Execute this command in Putty or LXTerminal.



Note: It is possible to copy-paste the sudo apt update command from this tutorial to Putty without retyping it manually in the console.

- Select the command with the mouse, then right-click Copy or CTRL+C

sudo apt update	Copier	Ctrl+C	
sudo apt upgrad	Sélectionner tout	Ctrl+A	
Exécuter cette commande dans Putty ou LXTerminal.	Mettre en évidence Barré Souligné Souligné déformé		
pi@raspberrypi:~ \$ sudo apt-get update	Signet	Ctrl+B	
Atteint :1 http://archive.raspberrypi.org/debian buster I: Réception de :2 http://raspbian.raspberrypi.org/raspbian ;	Compte de mots	[15,0	
<pre>kB] Réception de :3 http://raspbian.raspberrypi.org/raspbian bu ges [13,0 MB] 13,0 Mo réceptionnés en 25s (522 ko/s) Lecture des listes de paquets Fait pi@raspberrypi:~ \$</pre>	aster/main a	armhf Packa	
Back to Putty			
raspberrypi: ~			
spberrypi:~ \$			

A simple right click with the mouse and the command appears.

pi@raspberrypi:~ \$ sudo apt update

All you have to do is press the enter key on the keyboard to execute the command.

🛃 pi@i

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2.4 Transceiver connection

I can't mention all the possibilities of connection with TRX. I will only retain two cables, one with an ICOM7300 and the other with an Elecraft KX3.

2.4.1 RPI with an ICOM 7300

The TRX has a USB connector allowing its total management with a PC. The connection is made with a simple USB cable type A-B. This is the easiest configuration. It is possible to insert a USB Isolator (galvanic isolation) between the TRX and the Raspberry PI.



2.4.2 RPI with an Elecraft KX3

As the Raspberry PI does not have a sound input, you will need to add an external USB sound card to connect the audio inputs/outputs of the TRX. It will also be necessary to connect the USB / RS232 cable reserved for the CAT-System.



I deliberately used a cheap sound card. But there are other more powerful models. It is also possible to use a USB signalink style box instead of the USB sound card.

2.5 Connect a USB device to the Raspberry PI

It is interesting to know the exact name of the USB devices you are using in order to configure the radio software correctly.

- What happens when you connect a USB device to the Raspberry PI?
- Visually nothing at all (Except for USB memory sticks).
- So how do you know if the Raspberry PI has detected something?
- It's simple, use the lsusb command
- lsusb

This command lists all USB devices connected to the Raspberry PI.

Examples (on the Raspberry Pi 3) :

No external devices are connected to the Raspberry.

```
pi@raspberrypi:~ $ lsusb
Bus 001 Device 003: ID 0424:ec00 Standard Microsystems Corp. SMSC9512/9514 Fast Ethernet Adapter
Bus 001 Device 002: ID 0424:9514 Standard Microsystems Corp. SMC9514 Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

A keyboard and a mouse are connected to the Raspberry PI (first 2 lines)

pi@	raspi	perrypi:	~ Ş _	Lsus	3D	
Bus	001	Device	004:	ID	413c:2106	Dell Computer Corp. Dell QuietKey Keyboard
Bus	001	Device	005:	ID	093a:2510	Pixart Imaging, Inc. Optical Mouse
Bus	001	Device	003:	ID	0424:ec00	Standard Microsystems Corp. SMSC9512/9514 Fast Ethernet Adapter
Bus	001	Device	002:	ID	0424:9514	Standard Microsystems Corp. SMC9514 Hub
Bus	001	Device	001:	ID	1d6b:0002	Linux Foundation 2.0 root hub

The ICOM 7300 transceiver is connected, we see the PCM2901 sound card internal to the TRX, the CAT-System CP2102 interface and its HUB. (first 3 lines)

piera	ispo	errypı:	~ Ş .	Lsus	310	
Bus O	01	Device	008:	ID	08bb:2901	Texas Instruments PCM2901 Audio Codec
Bus O	01	Device	007:	ID	10c4:ea60	Cygnal Integrated Products, Inc. CP2102/CP2109 UART Bridge Controller [CP210x family]
Bus O	01	Device	006:	ID	0451:2046	Texas Instruments, Inc. TUSB2046 Hub
Bus O	01	Device	003:	ID	0424:ec00	Standard Microsystems Corp. SMSC9512/9514 Fast Ethernet Adapter
Bus O	01	Device	002:	ID	0424:9514	Standard Microsystems Corp. SMC9514 Hub
Bus O	01	Device	001:	ID	1d6b:0002	Linux Foundation 2.0 root hub
pi@ra	ıspb	errypi:	~ \$			

The inexpensive sound card CM108 and the CAT-System FT232 interface for the KX3 are

connected.

pi@raspberrypi:~ \$ lsusb Bus 001 Device 009: ID 0403:6001 Future Technology Devices International, Ltd FT232 Serial (UART) IC Bus 001 Device 010: ID 0d8c:013c C-Media Electronics, Inc. CM108 Audio Controller Bus 001 Device 003: ID 0424:ec00 Standard Microsystems Corp. SMSC9512/9514 Fast Ethernet Adapter Bus 001 Device 002: ID 0424:9514 Standard Microsystems Corp. SMC9514 Hub Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub

Usually the Raspberry PI already has the drivers for the most common devices. But some transceivers (especially SDR) require specific drivers (not discussed here). You should then refer to the manufacturer's website, or search with the VID (vendor identifier) and PID (product identifier). Below example with the FT232:

VID	PID
0403	6001



2.6 Sound card management

By default, the sound card control panel is not installed in the Raspberry PI.

[pi@raspberrypi: ~] Programmation Options 📩 Éducation 2 🕵 pavu Pulseaudio terminal mixer based in pavucontrol 🍨 Bureautique pamix-1.6~git20180112.ea4ab3b-3 Internet Accessoires PulseAudio controller for the system tray 👰 Outils d'administratior stray-0.7.1. Son et vidéo Communication 무 Graphisme 👸 Bureau GNOME Qt port of volume control pavucontrol 🔣 Bureau KDE Jeux pavucontrol-qt-0.14.1-1 🔄 Autres bureaux Autre Language package for pavucontrol-gt 2b Polices pavucontrol-qt-l10n-0.14.1-1 👔 Accessoires 🕌 Jeux Multiprotocol file grabber with textual and graphic control Graphisme Help pavuk-0.9.35-6.1 Internet PulseAudio Volume Meter Anciennes application pavumeter-0.9.3-4+b2 Localisation Appearance Settings Run.. 🚯 Multimédia Audio Device Settings Réseau 📌 Shutdown. The Autres PulseAudio Volume Control (pavucontrol) is a simple GTK+ based 🝵 Taille téléchargée 102,3 ko Clavier et souris volume control tool (mixer) for the PulseAudio sound server. In Licence unknown 4 Oéveloppement Configuration du Raspberry Pi contrast to classic mixer tools this one allows you to control both Source raspbian-stable-main A Édition the volume of hardware devices and of each playback stream Ì Main Menu Editor Cancel Apply 🐲 Outils système separately. It also allows you to redirect a playback stream to ОК Recommended Software

Install Pulse Audio Volume Control by following steps 1 to 4.

Restart the Raspberry PI (2 solutions)

	<mark>∑</mark> pi@		Graphic or in the console
	>		sudo reboot
Son et vidéo	> >		
Accessoires	>		國 pi@raspberrypi: ~
Help	``	Shutdown options 👻 🔺 🗙	pi@raspberrypi:~ \$ sudo reboot
Préférences	>	Shutdown	
Run		Reboot	
Shutdown		Logout	



Sound output check via 3.5 jack jack

Do not connect a transceiver or external USB sound card.



Select PulseAudio volume control

🗕 🛑 🗖	∑pi@raspberrypi: ~	
Programmation	>	
Internet	>	
🚯 Son et vidéo	> 👬 🖁 Contrôle du volume PulseAudio	
🚏 Graphisme	> 🔔 Lecteur multimédia VLC	Régler le niveau du volume

Contrôle du volume 🗸 🔺 🗙	Contrôle du volume 🗸 🔺 🗙
Lecture Enregistrement Périphériques de sortie	Lecture Enregistrement Périphériques de sortie
🖹 Audio interne Mono analogique 🔹 👔 📀	👬 Sons système 🔹
Port : Sortie analogique	Muet 100% (0,00dB)
Muet Base 100% (0dB)	📀 Chromium : Playback 🔹 📋
► Advanced	153% (11,00dB) Muet 100% (0dB)
Afficher : All Output Devices -	Afficher : Applications -

However, if there was no sound, a manual configuration must be done in order to correctly switch the sound output. Use LXTerminal or Putty and type the following command:

sudo amixer cset numid=3 1



The last digit "1" (in red) corresponds to the jack 3.5 output, if you put in the place of the number "2", it corresponds to the HDMI output.

Now connect a transceiver or a USB sound card to identify its reference with PulseAudio. Locating the sound card is now easier with the USB device.

Inexpensive sound card CM108	IC7300 internal PCM2901 sound card
Contrôle du volume 🗸 🗙 🗙	Contrôle du volume 🗸 🔺 🗙
Périphériques de sortie Périphériques d'entrée	Lecture Enregistrement Périphériques de sortie
🖺 CM108 Audio Controller Stéréo analogi 🔹 🙆 📀	🖺 Audio interne Mono analogique 🔹 📄 📀
Port : Haut-parleurs	Port : Sortie analogique 🔹
46% (-20,07dB) Muet 100% (0dB)	40% (-24,00dB) Muet Base 100% (0dB)
► Advanced	► Advanced
🖺 Audio interne Mono analogique 🔹 🙆 📀	🛱 PCM2901 Audio Codec Stéréo analogiq 🔹 📔 📀
Port : Sortie analogique 👻	Port : Sortie analogique 👻
Afficher : All Output Devices	Afficher : All Output Devices -

2.7 CAT-System interface management

The control of a transceiver is mostly done via a serial link. The time of DB9 sockets being over, USB / RS232 adapters are now used. In the Windows operating system, access to the communication port is made by knowing the COM port number. On Linux, the following command line must be used:

This command lists all tty devices and is also used for serial link.

The origin of the name tty comes from the English teletypewriter.

Here is the list when no USB serial communication device is connected.

We mark /dev/ttyAMA0 (the serial link of the Raspberry PI is located on the GPIO pins of the 40-pin connector)

pi@raspberrypi:~ \$ ls /dev/tty*						
/dev/tty	/dev/tty19	/dev/tty3	/dev/tty40	/dev/tty51	/dev/tty62	
/dev/tty0	/dev/tty2	/dev/tty30	/dev/tty41	/dev/tty52	/dev/tty63	
/dev/tty1	/dev/tty20	/dev/tty31	/dev/tty42	/dev/tty53	/dev/tty7	
/dev/tty10	/dev/tty21	/dev/tty32	/dev/tty43	/dev/tty54	/dev/tty8	
/dev/tty11	/dev/tty22	/dev/tty33	/dev/tty44	/dev/tty55	/dev/tty9	
/dev/tty12	/dev/tty23	/dev/tty34	/dev/tty45	/dev/tty56	/dev/ttyAMA0	
/dev/tty13	/dev/tty24	/dev/tty35	/dev/tty46	/dev/tty57	/dev/ttyprintk	
/dev/tty14	/dev/tty25	/dev/tty36	/dev/tty47	/dev/tty58		
/dev/tty15	/dev/tty26	/dev/tty37	/dev/tty48	/dev/tty59		
/dev/tty16	/dev/tty27	/dev/tty38	/dev/tty49	/dev/tty6		
/dev/tty17	/dev/tty28	/dev/tty39	/dev/tty5	/dev/tty60		
/dev/tty18	/dev/tty29	/dev/tty4	/dev/tty50	/dev/tty61		
pi@raspberrypi:~ \$						

If the USB / RS232 cable reserved for the CAT-System is connected, a new line appears. It is this name /dev/ttyUSB0 that you will have to use when configuring the software.

pi@raspberrypi:~ \$ ls /dev/tty*					
/dev/tty	/dev/tty19	/dev/tty3	/dev/tty40	/dev/tty51	/dev/tty62
/dev/tty0	/dev/tty2	/dev/tty30	/dev/tty41	/dev/tty52	/dev/tty63
/dev/tty1	/dev/tty20	/dev/tty31	/dev/tty42	/dev/tty53	/dev/tty7
/dev/tty10	/dev/tty21	/dev/tty32	/dev/tty43	/dev/tty54	/dev/tty8
/dev/tty11	/dev/tty22	/dev/tty33	/dev/tty44	/dev/tty55	/dev/tty9
/dev/tty12	/dev/tty23	/dev/tty34	/dev/tty45	/dev/tty56	/dev/ttyAMA0
/dev/tty13	/dev/tty24	/dev/tty35	/dev/tty46	/dev/tty57	/dev/ttyprintk
/dev/tty14	/dev/tty25	/dev/tty36	/dev/tty47	/dev/tty58	/dev/ttyUSB0
/dev/tty15	/dev/tty26	/dev/tty37	/dev/tty48	/dev/tty59	
/dev/tty16	/dev/tty27	/dev/tty38	/dev/tty49	/dev/tty6	
/dev/tty17	/dev/tty28	/dev/tty39	/dev/tty5	/dev/tty60	
/dev/tty18	/dev/tty29	/dev/tty4	/dev/tty50	/dev/tty61	
pi@raspberrypi:~ \$					

Always check the name of the device used to configure the CAT-System. Sometimes, depending on the driver, the name may be /dev/ttyACM0.

The explanations of the basic concepts are now complete. Let's move on to the installation and configuration of radio software.

Start by installing flrig. Go to the Preferences Menu, Add / Remove Software

	Add / Remove Software	~ ^ X			
Options					
 flrig Accessoires Outils d'administration Communication Bureau GNOME Bureau KDE Bureau KDE Multimédia Réseau Autres Développement 	 ham radio transceiver control program filig-1.3.42-1 filigi suite XmlRpc library libflxmlrpc1-0.1.4-5 filigi suite XmlRpc library - Development files libflxmlrpc-dev-0.1.4-5 2 This package contains libflxmlrpc – an customized implementation of the XmlRpc protocol – used by fldigi, flrig, flnet,	Taille téléchargée 55,1 ko			
A Édition	flmsg, flarq, flamp, fllog; a suite of programs written for amateur radio emergency communications.	Source Apply OK			
	Authentification	~ ^ X			
	Une authentification est nécessaire pour installer Identité : pi Mot de passe : 4	r un logiciel - 5			
	Annuler	Valider			

When testing the RPI4 flrig can be found in the Internet menu. The amateur radio menu will appear after fldigi installation.



Configuration test with the IC-7300

flrig IC-7300 👻 🗠 🗙	Configuration 🗸 🗸 🗙
File Config Memory Help	Xcvr Trace TCPIP PTT Aux Poll Send Cmds Restore Close
	Rig: IC-7300 🔻 Retries 🕊 4 2 🕨
AUX	Ser Port /dev/ttyUSB0 ▼ Retry intvl (4) € 50 Baud: 4800 ▼ Cmds (4) € 5
Po 40 80 Polling Vol 0 Trace	✓ 1 2 -StopBits Poll intvl (4) 4 200) >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
SQL 0	OPTT via CAT RTS/CTS Ox94 CI-V adr Default
Lock 1 1 CIrPBT 0	○PTT via RTS ♥RTS +12 v ○PTT via DTR ♥DTR +12 v
Nch 1500 Pwr 15 ● 20 dB PRE NB ■ Tuner	

Continue by installing fldigi: Preferences Menu, Add / Remove Software

Add / Remove Software 🗸 🗸 🗸						×		
Options								
fldigi Accessoires Outils d'administration		digital modem program for hamradio operators with UH dl-fldigi-3.2-2+buster debug symbols for dl-fldigi	KHAS mo	ods			ĺ	
Communication	• 🔁	digital modem program for hamradio operators fldigi-4.1.01-1						
🔣 Bureau KDE 📼 Autres bureaux	1	ham radio transceiver control program flrig-1.3.42-1		•				
Polices		amateur radio file encapsulation/compression utility flwrap-1.3.5-1						
Graphisme	1	fldigi suite XmlRpc library libflxmlrpc1-0.1.4-5						
 Internet Anciennes application 		fldigi suite XmlRpc library - Development files libflxmlrpc-dev-0.1.4-5						
Localisation		HAM Dx Cluster for Linux users pydxcluster-2.21-2+b5						I.
🔎 Réseau		console based ham radio contest logger						•
Autres Développement Á Édition	Fldigi is a n modes use program fo	modem program which supports most of the digital ed by hamradio operators today. You can also use the or calibrating your sound card to WWV or doing a measurement test. The program also comes with a CW	Taille	e téléchargée 2 Licence u Source r	2,2 Mo unknow aspbiar	n n-stable-r	mai	n
🕼 Outils système	decoder. Fl	ldigi is written with the help of the Fast Light Toolkit X	Ca	ancel Ap	oply	ОК		



Run Fldigi E^{I Fldigi} at the same time as flrig from the Amateur Radio menu Radio amateur Enable flrig and the audio port in connection with the audio card on the USB port

C <u>onfig</u> uration Fldigi 🔷 🔦	×						
Opérateur UI Chute d'eau Modems Rig ID Audio Divers Web Lancement automatiqu	e						
flrig RigCAT Hamlib XML-RPC PTT matériel GPIO							
flrig is the preferred method of tranceiver control							
Configuration Fldigi 🗸 🗸	×						
Opérateur UI Chute d'eau Modems Rig ID Audio Divers Web Lancement automatiqu	e						
Périphériques Settings Right channel Wav Alerts							
OOSS Périphérique:							
Capture: USB Audio CODEC: - (hw:1,0)							
♥ PortAudio Sortie: USB Audio CODEC: - (hw:1,0) ♦							
PulseAudio Server string:							
□E/S fichier seulement							
☑ Device supports full duplex							
Restaure défauts Sauvegarder Fermer	-						

Check the reception e.g. in PSK31 over 20 meters.

	fldigi vor4 1 01 / 10 7200	f4aab		R : 10 7000
	11ulgi ver4.1.0171C-7300-	14901	· · · ·	tirig IC-7300 • ^ ×
Eichier Mode Op Configuration Vue Lo	urnal <u>A</u> ide	Spot RxID TxID		<u>File</u> Config Memory Help
14070 000	Fréq 14072.022 On	Off 0700 In 599 Out 599	Cnty/Cntry tes	14070.000 14100.000
14070.000	bdicatif	Op Az		S3 S6 S9 +20 +40 +60 JufeA JufeA Ac > D Solit
USB-D 🔻 3600 💌 😵	🕒 💽 Qth	St Pr L		
CQ CQ de EA5EE EA5 pse K	EE			Vol 0 1/20 160 0058-70 1/20 MED 87 1
CQ 🕅 🛛 ANS 🎽 QSO 🏕 🛛 KN 🔢 🛛 S	< 📗 🛛 Me/Qth 🔹 Brag	T/R Tx 🕨 Rx 📗	TX 🕅 1	ATT Amp 1 NB AN Tuner PTT
500 1000	1500	2000 2500		
	NORM 444 2022		(T/B)	
BPSK31 S/N 27 dB IMD -17 (



flmsg is also available and easy to install

Add / Remove Software				
Options				
 fImsg Accessoires Outils d'administration Communication Bureau GNOME Bureau KDE Autres bureaux Polices Jeux Graphisme Internet Anciennes application Localisation 	amateur radio forms management editor flmsg-4.0.8.04-1 fldigi suite XmlRpc library libflxmlrpc1-0.1.4-5 fldigi suite XmlRpc library - Development files libflxmlrpc-dev-0.1.4-5 Une authentification Authentification y y x x June authentification est nécessaire pour installer un logiciel Identité : pi Mot de passe : g packages - please wait tente d'authentification Cancel			
🕅 Multimédia 🔎 Réseau	Annuler Valider			
 Autres Développement Édition Outils système 	FImsg is a simple forms management editor for the amateur radio supported standard message formats, including ICS, HICS, MARS, IARU, Radiogram NTS, Red Cross, and plaintext. It's data files are pure ASCII text that can be sent from point to point using the internet, amateur radio, or other electronic link.	able-m OK	ain	

2.9 Wsjt-x

With the Chromium browser, go to the main page of wsjt-x https://physics.princeton.edu/pulsar/K1JT/wsjtx.html, then download wsjtx_2.1.2_armhf.deb



Please note that the version of wsjt-x is constantly evolving.



Ce type de fichier risque d'endommager votre ordinateur. Voulez-vous vraiment enregistrer wsjtx_2.1.2_a....deb ?

Enregistrer

Annuler

Using LXTerminal or putty, type the following commands in order

cd Downloads		pi@raspberrypi:~ \$ cd Downloads/ pi@raspberrypi:~/Downloads \$		
		pi@raspberrypi:~/Downloads \$ 1s		
ls	ls Lima Sierra letters	wsjtx_2.1.2_armhf.deb		
		The file is present		
sudo dpkg -i wsjtx	2.1.2_armhf.deb	wsjt-x software installation		
sudo ant-get insta	11 -f	Libraries are missing, this command allows		
Sudo apt get insta	±± ±	you to find and install the missing files.		
continue ? [O/n]		0		

For the latest version of wsjt-x, if the error "locale :: facet :: _ S_create_c_locale name not valid" Go to the raspberry configuration from the command line (tutorial 4, page 5). Go to localization option, then change locale add in addition to your language the line en US.UTF8. Use the usual language by default.

wsjtx appears in the main menu



Note: If you download the file with a remote computer, it is possible to copy the file to the Raspberry PI with WinSCP. (See part 1)


You can recognize the CAT-System command on /dev/ttyUSB0, and the internal sound card of the IC7300 from Texas Instruments.

		Setting	IS			~ ^
General Radio Audio Tx M	acros Reporting	Frequencies	Colors	Advanced		
Rig: Icom IC-7300					Poll Intervi	al: 1 s 🚦
CAT Control		P	TT Metho	bd		
Serial Port /dev/ttyUSB0		-	⊙ vo <u>x</u>		○ <u>D</u> TR	
Serial Port Parameters			• C <u>A</u> T		⊖ R <u>T</u> S	
Baud Rate: 4800		•	Port /d	ev/ttyAMA0		
		Setting	<u>js</u>			× ^
Seneral <u>R</u> adio Audio Tx <u>N</u>	Macros Reporting	Frequencies	Colors	Advanced		
Soundcard						
Input: alsa_input.usb-Bu	rr-Brown_from_TI_U	SB_Audio_CO	DEC-00.a	inalog-stereo	•	Mono +
Output: alsa_output.usb-B	lurr-Brown_from_TI_	USB_Audio_C	ODEC-00	analog-stereo	-	Mono 🔹
		Settin	gs			× ^
Canaral Padio Audio Tv.	Macros Reporting	Froquencies	Colore	Advanced		
peneral Taglo Mono IXI	Macros Reporting	riequencies	001013	Auvanceu		
Prompt me to log QSO Log automatically (con	itesting only)			Op Call:		
Convert mode to RTTY	,					
dB reports to comment	ts					
Clear DX call and grid a	after logging					
Network Services Enable <u>P</u>SK Reporter S 	potting					
UDP Server						
UDP Server:	127.0.0.1	1	 Accept 	t UDP requests	3	
UDP Server port number.	2237	:	Notify	on accepted U	IDP request	
			 Accept 	ted UDP reque	st restores window	
Secondary UDP Server (depr	recated) ADIF broadcast					
Server name or IP address	127.0.0.1					
Server port number:	2333					1
					Cancel	OK

Check the reception e.g. in FT8 over 20 meters.

	WSJT-X v2	2.1.2 by K1JT	~ ^ X
File Configurations View Mode Decod	e Save Tools	Help	
Band Activity		Rx Frequency	
UTC dB DT Freq Message		UTC dB DT Freq Message	
071430 -1 0.1 1452 CQ HA1ZW JN86 071430 -13 0.2 1608 IZ4EFP SP7DE J092 071430 -8 -0.7 1659 EV500ZM <ra4hg> 7 071430 -1 0.2 1865 CN8QR SP9FV0 -18 071430 -1 0.2 1865 CQ SM7DAY J065 071430 -4 -1.1 2097 CQ SM7DAY J065 071430 10 -0.1 2265 CQ F1PPH JN07 071430 -21 0.1 199 CQ UX1VT KN68 071430 -20 0.3 883 CQ UZ9RR K051 071430 -16 0.3 1087 ON3YB UA6HGM R-11</ra4hg>	3	 071130 -9 0.1 1492 ~ IN3ADG IZ5BSA -05 071200 -5 0.1 1492 ~ IN3ADG IZ5BSA RR73 071300 -8 0.1 1492 ~ IW3AAD IZ5BSA -15 071330 -10 0.1 1492 ~ IW3AAD IZ5BSA RR73 071445 -5 0.1 1492 ~ IS0KNG IZ5BSA R-04 	
CQ only Log QSO Stop Mor	n <mark>itor</mark> <u>E</u> rase	<u>D</u> ecode E <u>n</u> able Tx <u>H</u> alt Tx <u>T</u> une ▼	Menus

With the Chromium browser, go to the main page of jtdx https://www.jtdx.tech/en/, then download jtdx-2.1.0-rc150_u_armhf.deb



Using LXTerminal or putty, type the following commands in order

cd Downloads		pi@raspberrypi:~ \$ cd Downloads/ pi@raspberrypi:~/Downloads \$ Go to the Downloads directory			
ls	ls for Lima Sierra letters	<pre>pi@raspberrypi:~/Downloads \$ 1s jtdx-2.1.0-rc150_u_armhf.deb pi@raspberrypi:~/Downloads \$ The file is present</pre>			
sudo dpkg -i jtdx-2.1.	0-rc150_u_armhf.deb	Jtdx installation			
sudo apt-get install -f		Libraries are missing, this command allow you to search and install the missing files.			
continue ? [0/n]		0			

It is possible to run JTDX manually with					pi@raspberrypi: ~		
LXTterminal and typing jtdx .	Fichier	Édition	Onglets	Aide			
	<pre>pi@raspberrypi:~ \$ jtdx</pre>						

With the Chromium browser, go to js8call's main page, <u>http://files.js8call.com/latest.html</u>, then download **js8call_2.1.1_armhf.deb**

🚳 🌐 🛅 🗾 🗾 pi@raspberrypi: ~ 🛛 🌀 files.js8call.com/late
S files is8call.com/latest bl × +
 ← → C ③ Non sécurisé files.js8call.com/latest.html
Latest JS8Call Download Links:
Before downloading, make sure to read the latest release announcements here: <u>https://groups.io</u> ,
If you run into problems, check the Known Issues list here first: <u>https://bitbucket.org/widefido/j</u>
The latest version of JS8Call is 2.1 (<u>changelog</u>):
Documentation:
JS8Call Guide: <u>https://docs.google.com/document/d/159S4wqMUVdMA7qBgaSWmU-iDI4C9</u>
RaspberryPi:
http://files.is8call.com/2.1.1/is8call_2.1.1_armhf.deb

A l'aide de LXTerminal ou de putty, taper les commandes suivantes dans l'ordre

cd Downloads		pi@raspberrypi:~ \$ cd Downloads/ pi@raspberrypi:~/Downloads \$ Go to the Downloads directory				
1s Lima Sierra letters		<pre>pi@raspberrypi:~/Downloads \$ ls js8call_2.1.1_armhf.deb jtdx-2.1 pi@raspberrypi:~/Downloads \$ The file is present</pre>				
sudo dpkg -i js8call_2	2.1.1_armhf.deb	Jtdx installation				
sudo apt-get install -f		If libraries are missing, this command allows to search and install the missing files (If wsjt-x and jtdx were installed before js8call, this command is not required)				
continue ? [O/n]		0				

2.12 GridTracker (Real-time tracking of Locators during a QSO)

With the Chromium browser, go to the following page: https://tagloomis.com/downloads/, then download GridTracker-Linux-Arm-1.20.0510.tar.gz



Using LXTerminal or putty, type the following commands in order

cd Downloads		pi@raspberrypi:~ \$ cd Downloads/ pi@raspberrypi:~/Downloads \$ Go to the Downloads directory				
ls	1s for Lima Sierra letters	pi@raspberrypi:~/Downloads \$ ls GridTracker-Linux-Arm-1.20.0510.tar.gz				
		The file is present				
tar -zxvf GridTracke	er-Linux-Arm-	Decompresses the archive (can be done				
1.20.0510.tar.gz		graphically with the file manager)				
sudo apt-get inst	all libgconf-2-4	Adds a missing library				
Souhaitez-vous co	ontinuer ? [O/n]	0				
cd GridTracker		Go to the Gridtracker directory				
./GridTracker		Executes the Gridtracker program.				



For this program, there is no special installation process, you need to use the file manager (1), browse to download (2), then run Gridtracker(3 and 4).

I advise you to move the directory in order not to delete it accidentally. To create an icon on the desktop, follow the instructions in the README.txt file



GridTracker works with WSJT-X



Help

2.13 Cqrlog

Manages the traffic log in connection with wsjt-x and automatically sends logs to EQSL, LOTW, HRDlog.net, etc., provided that the server in WSTJ-X is active (see page 15 Reporting menu)

Preferences menu, Add / Remove Software.

Add / Remove Software	V A X New QSO
Options	File View Window Statistics Online lo
Contraction operators	Open or create new log
ariog-2,3,0-2	Rew QSO Ctrl+F2
Accessoires	Show QSO list Ctrl+O
👰 Outils d'administratior	Remote mode for fldigi Ctrl+M
Anciennes application	✓ Remote mode for wsjt Ctrl+J
Dccalisation	Show/adit long note
🚯 Multimédia	Show/editiong note
🔎 Réseau	Send spot (~ or CTRL+W) Ctrl+W
COBLOG is an advanced ham radio longer based on MySQL	Add to band map (+,Ctrl+A)
Développement embedded database. Provides radio control based on hamlib	Licence unknown CW Messages
A Edition libraries (currently support of 140+ radio types and models), DX	Source raspbian-stable-main Reload CW interface
Cluster connection, HamQTH/QRZ callbook (XML access), a craviner internal OSL manager database support and a most	ancel Apply OK Comment to callsigns
Science Science	Refresh TBX/ROT control
As soon as you launch cqrlog, don't forget to create the dat	abase. Watch the
KOPIR carlog videos to activate the "remote" mode wsit-x.	lune Ctrl+I
,	🤌 Preferences Ctrl+P
	Close Ctrl+Q
Danu Activity	Rx Frequency
UTC dB DT Freq Message UTC	C dB DT Freq Message
123715 -10 1.0 1698 ~ CQ R9FI L087 12361	15 Tx 1290 ~ TF3PPN F4G0H JN07
123715 -14 0.0 1752 ~ K8FF UA0LVO PN53 . 12360	00 -19 0.1 1291 ~ F4GOH TF3PPN +00
123715 11 0.2 2145 ~ JS6TKY DJ6GI J043	17 Tx 1290 ~ TF3PPN F4GOH R-19
123/15 -8 0.1 2403 ~ UN8LYA OH3QL KP20	27 Tx 1291 ~ TF3PPN F4GOH R-19
$123715 - 20 = 0.4 + 1103 \sim <0.901AH > JH20FJ = 12364 + 12366 + 123666 + 12366 + 123666 + 123666 + 123666 + 123666 + 123666 + 123666 $	45 IX 1291 ~ IF3PPN F4GOH R-19
123715 -9 0.8 1345 ~ CO R10AY LP04	16 Ty 1291 ~ F400H F5PPN KK73
123715 -9 0.0 2128 ~ CQ IU8GUC JM89	
	90 -9 0.1 1291 ~ CU TESPEN HP94

CQ only	Log <u>Q</u> SO	<u>S</u> top	<u>M</u> onitor	<u>E</u> rase	<u>D</u> ecode	E <u>n</u> able Tx	<u>H</u> alt Tx	<u>T</u> une	🗹 Menus
Save the d	qso with w	sjt-x. Cqrlog	• will be u	updated au	tomatically	y.			
File View	Filter QSL	Sort Statistics	Callbook	< Data Onli	ne log				He
li 🔬 🔬	ti in a star in	💼 💷 🔾 🎲		1 🗋 🔒 🖬	eQ eQ 🎟 🛉	i d ree			

QSO in log: 1			DXCC:1				DXCC CFM: 0
qsodate	time_on	callsign		freq	mode	rst_s	
2020-05-19	12:36	TF3PPN		7.0250	FT8	-19	

2.14 Installation de Qsstv

Preferences menu, Add / Remove Software

Add / Remove Software						
Options						
qsstv Accessoires Outils d'administration Réseau	Qt-based slow-scan TV and fax qsstv-9.2.6+repack-1					
Autres Développement Á Édition W Outils système	Qsstv is a program for receiving slow-scan television and fax. These are modes used by hamradio operators. Qsstv uses a soundcard to send and receive images.	Taille téléchar Lice Sou Cancel	rgée 693,1 ko ence unknowr urce raspbian Apply	n n-stable Oł	-main <	

Configuration			~ ^ X			flrig IC	-7300	× ^	×
Operator Directories Gui Sound CAT CW Repeater FTP	Waterfall Hybr	rid Notifications	DRM Pre	<u>F</u> ile <u>(</u>	Config	Memory Hel	p		
Special Serial Port Enable PTT serial Interface PTT Serial Port /dev/ttyS0	🖌 +RTS 🗌	+DTRRTS	DTR	14 53	1074 S6 S9	1.000 +20 +40 +60		00.00(3 Split
Hamlib Control Cat Interface				Po 40	80	120 160	1 3600	USB-D	
Radio Model 4 FLRig, FLRig	Parity None	 Databits 8 		Vol	0				_
CIV Address	Baudrate 4800	→ StopBits 1 →		MED SOL	87			<u>l</u>	\equiv
Serial Port/Host localhost:12345	Handsh	nake None 👻			4				=
PTT Control via: CAT (Voice port) CAT (Data port) RTS DTR				Lock	0 -		_1_		=
Restart CAT Interfac	e			CIrPBT	0				=
XMLRPC Interface	7050			Pwr	0				=
Enable XMLRPC Interface Port	/362				π_ [Amp 1 🔲 NB		Tuner 🗌 🗆 P	Π
TX on Delay 0,0 2 in seconds									
		Cancel	ОК	1					

2.15 Gpredict

Satellite passage prediction software.

Preferences menu, Add / Remove Software

	Add / Remove Software	~	^	×
Options				
🕵 gpredict	Satellite tracking program gpredict-2.3-33-gca42d22-1			
 Accessoires Outils d'administration Communication 	GNU R create tidy data frames of marginal effects for 'ggplot' r-cran-ggeffects-0.8.0-1			
🕅 Multimédia 🔎 Réseau				
 Autres Développement Édition 	Gpredict is a real time satellite tracking and orbit prediction program for the Linux desktop. It uses the SGP4/SDP4 propagation algorithms together with NORAD two-line element source raspbian-sta	able-	ma	in
👰 Outils système	Some core features of Gpredict include:	ОК	(

Start by updating the TLEs (Two-Line Elements: "Two-Line Orbital Parameters"), then change the position of the station on the GROUND (preferences menu).



F4GOH – KF4GOH

Tutorial

					GI	PREDICT Préférences :: Général
Fichier	Édition Aide	×	Format Nombres	Stations au sol	Mise à jour T	TLE Archives de messages
2020/0	Lindate TLE data from network	Général	Nom		Positic	n
2020/0	opdate TEE data nonrinetwork		f4goh		France	, TELOCHE
T4gon · Fra	Update TLE data from local files	Modules		Éditer les donné	es de la statio	n au sol 🗸 🔺 🗙
The state	Update transponder data		Nom	f4goh		
60°	Dréférences	Interfaces	Description	QTH		
	Preferences		Position	France, TELOCH	IE	Sélectionner
		Prédiction	Latitude (°)	47,8958 -	- + Nord	-
30°			Longitude (°)	0,2917 -	- + Est	•
	and the second se		Locator	JN07DV		
0°			Altitude	5 -	- + m ASI	-
			St. Météo			Sélectionner
					Clear	Cancel OK
-30°			Add new	Édition	Suppres	ssion
-60°	A0-73					



Next part: Using an rtl sdr receiver key.





Raspberry Pi for HAM Radio Part 3



Prerequisite: HAM Radio tutorial with the Raspberry Pi Part 1 and 2.

Summary:

Part 3: Using RTL-SDR Key

3.1 Introduction	P. 2
3.2 GQRX	P. 3
3.3 RTL-SDR Drivers	P. 4
3.4 Listen VHF with GQRX	P. 9
3.5 Listen HF with GQRX	P. 11
3.6 FT8 decoding with GQRX	P. 12
3.7 First step with GNU Radio	P. 13
3.8 Using ready pisdr iso image	P. 14

Version du 16/02/2021 V1.3

RPI part 3-V1.3.docx

3.1 Introduction.

In this last tutorial about Raspbian in graphical mode, I explain the installation procedure of common software using the RTL-SDR receiver key. For several years, this famous key has not stopped evolving. The latest version is the RTL-SDR V3.



The internal structure shows the 2 main integrated circuits as well as two "switches" to switch between HF and VHF/UHF band. In addition, the key now has a Bias T avoiding the need to use an external power supply for a preamplifier.

Do not hesitate to consult the official website of the key and browse the different menus. https://www.rtl-sdr.com/rtl-sdr-blog-v-3-dongles-user-guide/

1112-0013 (11122020) and 30100 and 100010003 and projects. Also reatining Allspy, nacking , 100 , 3010000 and 1000
--

номе	ABOUT RTL-SDR	QUICK START GUIDE	FEATURED ARTICLES 🔻	SOFTW	ARE 🔻	SIGNAL ID WIKI	FORUM	RTL-SDR STORE	GUIDE BOOK	CONTACT
			TUTORIALS	►	AIR AN	ID MARINE	►	ADS-B AIRCRAFT R	ADAR	
			PRODUCT REVIEWS	►	SATEL	LITE	►	ACARS DECODING		
	:K STARI	' GIIIDF	INTERESTING	►	TERRE	STRIAL	►	AIS SHIP TRACKING	;	
4014	-	GOIDE	QUICK START GUIDES	►	SINGL	E BOARD COMPUTE	R ►	DECODING WEATHE	RBALLOONS	
DT	I_CND	глм	DIRECT SAMPLING MOD		RADIO	ASTRONOMY	►			
NI	L-9DIV	.60111	ROUNDUP OF SOFTWARE D RADIOS	EFINED	OTHER		Þ			
			KERBEROSSDR	•	-					

Despite this, I never found this site very clear. Some explanations are well done and others are really sloppy. There are a lot of videos with demonstrations of operation, showing the decoding of this or that signal. At that time, we ask ourselves the following question:

"How do you install these programs in the computer or the Raspberry Pi? Then starts a real police investigation in order to cross various sources of information to succeed in installing the programs. It's a real shame that this environment is exclusively the business of IT specialists, because it deserves to be more democratized. I have often tested installation procedures from websites or even very recent books with often very mixed success. I imagine that an OM alone in its shack may have difficulty to succeed. Hence the interest of radio clubs where someone who has already done the installation can provide help. Without the information remaining "word of mouth", consider making a complete PDF installation sheet by publishing it on the site of the club concerned.

3.2 GQRX

Gqrx is an open source SDR receiver software using GNU radio and the Qt graphical toolkit. There are two possible command line installations with either LXTerminal or Putty:

sudo apt update	
sudo apt upgrade	
sudo apt install gqrx-sdr	

Or in the Preferences menu, Add / Remove Software.

Search on the keyword "gqrx" (1), select the package to be installed (2), then ok (3), enter again the password created during installation (4 and 5) (See part 1).

	Add / Remove Software	~ ^ X
Options		
gqrx 1	Software defined radio receiver gqrx-sdr-2.11.5-1+b4	
 Accessoires Outils d'administration 	digital radio transmission decoder multimon-ng-1.1.7+dfsg-1	
Communication	Authentification	~ ^ X
 Bureau GNOME Bureau KDE Autres bureaux Polices Jeux 	Installing packages - please wait En attente d'authentification Identité : pi Cancel Mot de passe	logiciel
 Graphisme Internet Anciennes application Localisation Multimédia Béseau 	4 Annuler	Valider 5
Autres Développement Édition Outils système	Gqrx supports many of the SDR hardware available, including Funcube Dongles, rtl-sdr, HackRF and USRP devices. Includes AM, SSB, FM-N and FM-W (mono and stereo) demodulators, and Special FM mode for NOAA APT. Displays FFT plot and spectrum waterfall.	3 able-main OK

In both cases, you will have to wait at least 20 minutes, because there are more than 500MB of files to download and install.



F4GOH – KF4GOH 3.3 RTL-SDR Drivers

Remove the rtl-sdr drivers that were set by default with gqrx-sdr and install the latest version of the software manually from the command line with LXTerminal or Putty.

sudo apt-get remove rtl-sdr

pi@raspberrypi:~ \$ sudo apt-get remove rtl-sdr librtlsdr0 librtlsdr-dev Lecture des listes de paquets... Fait Construction de l'arbre des dépendances Lecture des informations d'état... Fait Le paquet « librtlsdr-dev » n'est pas installé, et ne peut donc être supprimé Le paquet « librtlsdr0 » n'est pas installé, et ne peut donc être supprimé Le paquet « rtl-sdr » n'est pas installé, et ne peut donc être supprimé Les paquets suivants ont été installés automatiquement et ne sont plus nécessair es : libmicrodns0 libqt5charts5 xlog-data Veuillez utiliser « sudo apt autoremove » pour les supprimer. 0 mis à jour, 0 nouvellement installés, 0 à enlever et 0 non mis à jour. i@raspberrypi:~ \$

Retrieve the official files.

git clone https://github.com/osmocom/rtl-sdr.git

pi@raspberr	pi@raspberrypi:~ \$ git clone https://github.com/osmocom/rtl-sdr.git								
Clonage dans 'rtl-sdr'									
remote: Enu	remote: Enumerating objects: 65, done.								
remote: Cou	unting objects	s: 100% (6	5/65), done						
remote: Con	mpressing obje	ects: 100%	(38/38), do	one.					
remote: Tot	al 1863 (delt:	ta 25), reu	used 55 (de	lta 23), pad	ck-reused	1798			
Réception d	l'objets: 100%	£ (1863/18)	63), 448.80	KiB 1.11	MiB/s, f	ait.			
Résolution	des deltas: 1	LOO% (1317,	/1317), fait	τ.					
pi@raspberr	rypi:~ \$ ls								
audio	Downloads	Music	qsstv	Templates	Videos				
Desktop	GridTracker	Pictures	rtl-sdr	tx drm					
Documents	MagPi	Public	templates	tx stock					
pi@raspberr	pi@raspberrvpi:~ \$								

Install the libraries.

sudo apt install build-essential cmake usbutils libusb-1.0-0-dev



F4GOH - KF4GOH pi@raspberrypi:~/rtl-sdr/build \$ sudo apt install build-essential cmake usbutils libusb-1.0-0-dev Lecture des listes de paquets... Fait Construction de l'arbre des dépendances Lecture des informations d'état... Fait build-essential est déjà la version la plus récente (12.6). usbutils est déjà la version la plus récente (1:010-3). Les paquets suivants ont été installés automatiquement et ne sont plus nécessair es : libmicrodns0 libqt5charts5 xlog-data Veuillez utiliser « sudo apt autoremove » pour les supprimer. Les paquets supplémentaires suivants seront installés : cmake-data libjsoncpp1 librhash0 libusb-1.0-doc libuv1 Paquets suggérés : cmake-doc ninja-build Les NOUVEAUX paquets suivants seront installés : cmake cmake-data libjsoncpp1 librhash0 libusb-1.0-0-dev libusb-1.0-doc libuv1 0 mis à jour, 7 nouvellement installés, 0 à enlever et 0 non mis à jour. Il est nécessaire de prendre 40578 ko dans les archives. Après cette opération, 23,6 Mo d'espace disque supplémentaires seront utilisés. Souhaitez-vous continuer ? [O/n]

Type these commands in the order :

cd rtl-sdr

mkdir build

cd build

cmake -DINSTALL UDEV RULES=ON -DDETACH KERNEL DRIVER=ON .../

```
pi@raspberrypi:~ $ cd rtl-sdr/
pi@raspberrypi:~/rtl-sdr $ mkdir build
pi@raspberrypi:~/rtl-sdr $ cd build/
pi@raspberrypi:~/rtl-sdr/build $ cmake -DINSTALL_UDEV_RULES=ON -DDETACH_KERNEL_D
RIVER=ON ../
  - The C compiler identification is GNU 8.3.0
-- Check for working C compiler: /usr/bin/cc
 -- Check for working C compiler: /usr/bin/cc -- works
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
 -- Detecting C compile features
 - Detecting C compile features - done

    Build type not specified: defaulting to release.

 - Extracting version information from git describe...

    Looking for pthread.h

 - Looking for pthread.h - found
```

sudo make install

```
pi@raspberrypi:~/rtl-sdr/build $ sudo make install
Scanning dependencies of target convenience_static
[ 3%] Building C object src/CMakeFiles/convenience_static.dir/convenience/convenience.c.o
[ 6%] Linking C static library libconvenience_static.a
[ 6%] Built target convenience_static
Scanning dependencies of target rtlsdr
[ 9%] Building C object src/CMakeFiles/rtlsdr.dir/librtlsdr.c.o
[ 12%] Building C object src/CMakeFiles/rtlsdr.dir/tuner_e4k.c.o
[ 12%] Building C object src/CMakeFiles/rtlsdr.dir/tuner_fc0012.c.o
[ 13%] Building C object src/CMakeFiles/rtlsdr.dir/tuner_fc0013.c.o
[ 21%] Building C object src/CMakeFiles/rtlsdr.dir/tuner_fc2580.c.o
[ 25%] Building C object src/CMakeFiles/rtlsdr.dir/tuner_r82xx.c.o
[ 28%] Linking C shared library librtlsdr.so
```

sudo ldconfig

	Set runtime	path of "/usr/local/bin/rtl_fm" to ""
	Installing:	/usr/local/bin/rtl_eeprom
	Set runtime	<pre>path of "/usr/local/bin/rtl_eeprom" to ""</pre>
	Installing:	/usr/local/bin/rtl_adsb
	Set runtime	<pre>path of "/usr/local/bin/rtl_adsb" to ""</pre>
	Installing:	/usr/local/bin/rtl_power
	Set runtime	<pre>path of "/usr/local/bin/rtl_power" to ""</pre>
pi(raspberrypi	~/rtl-sdr/build \$ sudo ldconfig
pi(raspberrypi	~/rtl-sdr/build \$

sudo nano /etc/modprobe.d/rtlsdr-blacklist.conf

pi@raspberrypi:~/rtl-sdr/build \$ sudo nano /etc/modprobe.d/rtlsdr-blacklist.conf

```
blacklist dvb_usb_rtl28xxu
blacklist rtl2832
blacklist rtl2830
blacklist dvb_usb_rtl2832u
blacklist dvb_usb_v2
blacklist dvb_core
```

Copy and paste the above list into the nano editor

Reminder right click to paste the text in the nano editor



Save the file using the Ctrl + o keys, then the enter key to validate the recording.	Exit the editor using Ctrl + x.					
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
Tabazertyui op ^ £	Tabazertyuiop^£					
Verr. maj q s d f g h j k l m % µ *	Verr. maj q s d f g h j k l m % µ *					
Maj > w x c v b n ? / § Maj † suppr	Maj > w x c v b n ? . / . § Maj † Suppr					
Ctrl Z Alt AltGr	Ctrl 🕶 Alt AltGr 🖩 Fn Ctrl 🈁 + 😁					

Restart the Raspberry PI

pi@raspberrypi:~/rtl-sdr/build \$ sudo reboot

sudo reboot

Verification: Plug the rtl-sdr key into a USB port on the Raspberry Pi. With LXTerminal or Putty, type the following command line:

lsusb

Locate the rtl-sdr key: RTL238 DVB-T

Case of the Raspberry Pi 3 :

pi@raspberrypi:~ \$ lsusb Bus 001 Device 004: ID 0bda:2838 Realtek Semiconductor Corp. RTL2838 DVB-T Bus 001 Device 003: ID 0424:ec00 Standard Microsystems Corp. SMSC9512/9514 Fast Ethernet Adapter Bus 001 Device 002: ID 0424:9514 Standard Microsystems Corp. SMC9514 Hub Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub



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Case of the Raspberry Pi 4 :

pi@1	raspl	berrypi	~ \$ 1	Lsus	3b	
Bus	002	Device	001:	ID	1d6b:0003	Linux Foundation 3.0 root hub
Bus	001	Device	003:	ID	0bda:2838	Realtek Semiconductor Corp. RTL2838 DVB-T
Bus	001	Device	002:	ID	2109:3431	VIA Labs, Inc. Hub
Bus	001	Device	001:	ID	1d6b:0002	Linux Foundation 2.0 root hub

With LXTerminal or Putty, type the following command line : (be careful, underscore key)

rtl test

The rtl-sdr key should be recognized, if not, disconnect and reconnect the key and restart the test.



Exit the program by pressing the Ctrl key and the c key (Ctrl+c) at the same time.

If rtl_test displays this message over and over again lost at least 112 bytes . reinstall the program using the manual method.

Calculation optimization:

The program **volk** profile creates a profile to calculate the FFT (*) optimized for the system on which it runs. This will take some time (20 minutes), but will improve graphics performance. With LXTerminal or Putty, type the following command line: (beware underscore key)

sudo volk_profile						
pi@raspberrypi:~ \$ sudo volk_profile						
RUN_VOLK_TESTS: volk_64u_popcntpuppet_64u(131071,1987)						
no architectures to test						
RUN_VOLK_TESTS: volk_64u_popcntpuppet_64u(131071,1987)						
no architectures to test						
(*) FFT : <u>https://en.wikipedia.org/wiki/Fast_Fourier_transform</u>						

F4GOH – KF4GOH 3.4 Listen VHF with GQRX

The amateur radio menu is starting to look good



After connecting PC speakers to the 3.5 jack on the Raspberry PI, run the GQRX program. Select the rtl-sdr key. Note the link between rtl=0 and the test performed with rtl_test .

🦺 Gqrx	Complex Sampled (IQ) File	Conf	figure I/O devices 🛛 👻 🤞	~ X	pi@raspb∉
	Generic RTL2832U OEM :: 00000001	I/O input			Fichier Édition Onglets Aide
	RFSPACE Cloud-IQ Receiver	Device	Realtek RTL2838UHIDI	•	Found 1 device(s): 0: Realtek, RTL2838UHIDIR, SN: 00000001
	RFSPACE NetSDR Receiver	Dovice string	rtl=0		Using device 0: Generic RTL2832U OFM
Con	RFSPACE SDR-IP Receiver	Device string			Detached kernel driver
Con	RFSPACE SDR-IQ Receiver	Input rate	1800000	*	Supported gain values (29): 0.0 0.9 1.4 2.7
I/Q input	RTL-SDR Spectrum Server	Decimation	None	•	.7 22.9 25.4 28.0 29.7 32.8 33.8 36.4 37.2 3 [R82XX] PLL not locked!
Device	Realtek RTL2838UHIDIR SN: 00000001	Sample rate	1.800 Msps		Sampling at 2048000 S/s.
Device string	Red Pitaya Transceiver Server	Bandwidth	0.000000 MHz		
Input rate	Other	INBLO	0.000000 MHz	+	
Decimation	None	LIND LO	0,000000 10112	-	
Sample rate	1.800 Msps	Audio output			
Bandwidth	0.000000 MHz	Device	Default	•	
		Sample rate	48 kHz	•	
LINB LU	0,000000 MHZ -				
Audio output			Cancel OK		
Device	Default 🗸				•
Sample rate	48 kHz 🗸				
	Cancel OK				

Before any specific decoding, it is vital to check the correct operation of the unit. Start the software (1), adjust the frequency on the FM broadcast band (2), select the WFM mode (mono). If the sound is jerky, adjust the FFT size and Rate (5), finally adjust the sound output level (6).

Gqrx 2.11.5 - rtl=0	~ ^ X	
<u>File T</u> ools <u>V</u> iew <u>H</u> elp		
1 🔤 📇 🗔 🐮 🔤 🍠 🗶 💠		
	Receiver Options	FFT Settings 🗗 🗙
-9 dBFS	-301.000 kHz	FFT size 4096 👻 RBW: 439.5 F
-20	Hardware freq: 101.000000 MHz	5 Rate 15 fps 🗸 Overlap: 0%
1442 White been we have been been been been been been been be	Frequency 100699,000 🛔 kHz	Time span Auto 🕞 Res: - s
-80 [[[]ไม้ระ สมิกรัฐที่มีการที่ได้สามารถไทยระ สุขัญหาสามาหาร์พรัฐรัฐรัฐได้ได้ไ	Filter width Normal 🗸	Window Hann 🗸
-100	Filter shape Normal 🗸	Averaging
100.5 101.0 101.5	• Mode WFM (mono)	Pandapter 🗾 Watei
		Peak Detect Hold
	AGC UII •	Pand. dB Loc
	Squelch -150,0 dB 📮 A R	Wf. dB
	Noise blanker NB1 NB2	Freq zoom
	Input con Receiver Opt FFT Sett	Input con Receiver Opt FFT Sett
	Audio 🗗 🗙	Audio 4 🗗 🗙
	-20 -40	-20 -40
	5 10 <mark>6</mark> 15 20	Δμ. 5 10 15 20
	Gain:7.0 dB	Gain:7.0 dB
	UDP Rec Play	UDP Rec Play

In case of use with an external sound card, select Audio Output from the DEVICE drop-down menu.



If however the sound is very jerky, lower the screen resolution and avoid using VNC Viewer which takes a lot of processor resources.

→ Menu Preferences, RPI configuration, Display, set resolution.

F4GOH – KF4GOH 3.5 Listen HF with GQRX



Noise blanker

Input con...

Audio

RAVM

Gain:

UDP

NB1

Receiver Opt...

Mary M. Maria

Rec

NB2

FFT Sett.

-26.2 dB

Input con...

Gain:

UDP

🗗 🗙 🛛 Audio

Receiver Opt.

Rec

FFT Sett..

₽×

-26.2 dB

Remember to disable the CAT system if you haven't already done so:





Decoding is immediate. A good way to use the Raspberry PI for listening without hogging a PC.

						WSJT-X - Wide (Graph					× ^ X
 Control 	200	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400
South States of States		Set of A TO DOWN				the second second		No				
								State of the second sec				
					1		~~~ /~~~	- ()		pro promision	1.	
		Bins/Piv	el 2 👛 Start 0 I	-IZ Polette	Adjust 🔽 E	atten 🗌 Bef Sne				Spec 30 %		
		IT65.25		Default	- Cum					Smooth 1		1
		0100 20	WIS ITLY V2	1.2 by K1 IT	u v	ulative			Capy 2 11 5	rtl_0 direct_comm_1	2	
File Config	urations View	Mode Deco	de Save Tools	Help			File	Tools View Help	Gqix 2.11.5 -	rti=o,uirec_samp=.	Z	× ^ ^
the boing	Pope	Activity	ac ourc 10010	(icip	Dx Fraguada				•	LA I		
UTC dB	DT Freq Mes	sage		UTC dB DT	Ereg Message	y				(
161700 -13	1.1 1498 ~ PD1	HPB HB9ASX R	-09 *	161630 -14 2.2	1287 ~ Y09CEB DG1	HTF J061		7.073.0	600 🚟	-60 -40 -20 0 Rec	eiver Options	B' X
161700 3 161700 -2	1.1 1714 ~ YDG 1.5 1786 ~ YO9	CEB DL2KWA R	50 +03	161700 -7 2.5	1287 ~ Y09CEB DG1	HTF JO61			6 08+5	2	70.6	0 0 kHz
161700 -17 161700 -15	1.4 1888 ~ CQ 1.5 1990 ~ DL3	M6JVJ I083 YDX 0Z5THY -:	14				-20			На	rdware freq:	6.803000 MHz
161700 -5 161700 -16	1.5 2098 ~ <on 1.7 2400 ~ CQ</on 	DX UT3NK KN4	К 9 🛛 📲				-40				Frequency	7073.600 kHz
161700 -7 161700 -2	2.5 1287 ~ YO9 2.2 1711 ~ YD6	CEB DG1HTF JO SJK DJ3WK JO	061 42 •				-60		N	n .		- (4, 4, 12)
CQ only	Log <u>Q</u> SO	Stop	onitor <u>E</u> rase	Decode En	able Tx <u>H</u> alt Tx	<u>T</u> une 🗸	Menus vy 80	mmy	Murphanner	mymm	Filter width User	(4.4 K) ¥
20m 🔹	14.07	4 000	Tx even/1st	<	<		-100 Pwr			F	ilter shape Norr	nal 🗸
			Tx 1291 Hz	Hold Tx Freq	Calling CQ	Answering CQ		7.04 7.06	7.08 7.10 7.12	7.14 7.1	Mode USB	•
-80	DX Call	DX Grid		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	°_ CQ	Grid		ang ang sa a	1. A.P. 2. 64.42		AGC Med	ium 🖌
•	TF3PPN	HP94	Bx 1291 Hz		dB	R+dB		a state and		the little is	Sauelch -15	0.0 dB A B
-60	Az: 333	2249 km	Denet 15		BBB	73				No.	ico blopkor NE	
-40	Lookup	Add	Report-15			10			Late dal ho			11 IND2
-20	Foortab	7100	🖌 Auto Seq 🕒	🖌 Call 1st		 Gen ms 	g _			Inp	ut con Receiv	er Opt FFT Sett
	2020 r	nai 21								Aud	io	₽×
69 dB	16:1	7:22			TNX 73 GL	Free ms	ig _		2 8 8 A 10	14 (S. 1996)	20	
											40	MullerMans
Receivin	g FT8				7/	15	WD:5m	No. In the second		· · · · · · · · · · · · · · · · · · ·	Mananammanhh	20.040
										Ga	IDD Dee	-20.0 dB

3.7 First step with GNU Radio

GNU Radio is a software suite dedicated to the implementation of sdr radios. The signal processing is done with GNU companion using blocks in a graphical way.

Execute the GNU companion program located in the Radio amateur menu. There is a lot of video on Youtube

After saving the file, run the script by clicking on the arrow (1). An error message is displayed (2). Ignore it



Watch also the videos of David Haworth <u>WA9ONY</u> and especially the introduction of the rtl-sdr key with GNU Radio : (<u>RTL SDR Raspberry Pi 4 GNU Radio Tutorial 1</u>)

I set the frequency to 107.7Mhz in osmocom Source



3.8 Using ready pisdr iso image

There is a distribution of Raspbian called **pisdr** with many software already preinstalled.

https://github.com/luigifcruz/pisdr-image

Download the file **2020-03-08-PiSDR-vanilla.img.xz** by clicking on download latest Image.

1.53 GB

Download

The download file is hosted on GitHub Releases. Click in the button below to go to the latest release and choose the .tar.xz file to start downloading your PiSDR image. No .xz extraction is required. Use this file directly with the flashing software.

2020-11-13-PiSDR-vanilla.img.xz



Download Latest Image

With the disk utility Pi imager, select the use custom menu

👸 Raspberry Pi Imager	r v1.2	
	Operating System	x
	LibreELEC A Kodi Entertainment Center distribution	>
0	Ubuntu Choose from Ubuntu Core and Server images	>
۹,	Misc utility images EEPROM recovery, etc.	>
Î	Erase Format card as FAT32	
	Use custom Select a custom .img from your computer	

Insert the micro Sd card into a USB reader on the PC, select the SD card reader here GENERIC USB Reader, then click on WRITE.

PC	Operating System	SD Card	
mSD	IMAGERPI_DESKTOP.IMG	GENERIC MASS-ST	WRITE

In case of difficulty to copy the disk image, use the etcher utility, based on the same principle as Pi Imager.

Flash OS images to SD cards & USB drives, safely and easily.

https://www.balena.io/etcher/

When powering up with the HDMI display, I did not see any sound on the 3.5 jack output.

Perform the first power-up with the **HDMI display** disconnected to check the sound output on the 3.5 jack.

Use the Putty utility to connect the Raspberry Pi with an Ethernet link.







sudo apt-get install pavucontrol

- Redirect the sound to the 3.5 jack socket

sudo amixer cset numid=3 1
 <pre>pi@pisdr:~ \$ sudo amixer cset numid=3 1 numid=3,iface=MIXER,name='PCM Playback Route' ; type=INTEGER,access=rw,values=1,min=0,max=3,step=0 ; values=1</pre>

- Set the volume to 100%.

	amixer	sset 'M	aster'	100%
p. S	i@pisdr:~ \$ amixer imple mixer contro Capabilities: pvo Playback channels Limits: Playback Mono: Playback 65	r sset 'Master' 1 ol 'Master',0 olume pvolume-joi s: Mono 0 - 65536 5536 [100%] [on]	00% ned pswitch psw:	itch-joined

- Check the sound output by generating a test noise.

aplay /usr/share/sounds/alsa/Noise.wav aplay /usr/share/sounds/alsa/Noise.wav Lecture WAVE '/usr/share/sounds/alsa/Noise.wav' : Signed 16 bit Little Endian, quence 48000 Hz, Mono Normally, sound should be present on the 3.5 jack output. Then stop the Raspberry Pi

sudo halt

Turn off the power while you reconnect the HDMI cable. Turn the Raspberry Pi back on using the keyboard and mouse.

RPI part 3-V1.3.docx

You have to start by configuring the country, like the tutorial in part 1.



List of supported SDR Receivers	List of Installed Software
 <u>Airspy HF+ Discovery</u> <u>Airspy Mini</u> <u>Airspy R2</u> <u>LimeNET Micro</u> <u>LimeSDR Mini</u> <u>LimeSDR USB</u> <u>PlutoSDR</u> <u>RTL-SDR</u> <u>HackRF</u> 	 <u>GNURadio</u> <u>GQRX</u> <u>LimeSuite</u> <u>LimeVNA</u> <u>SDRAngel</u> <u>Soapy Remote</u> <u>LeanSDR</u> <u>VIRGO</u> <u>CygnusRFI</u> rpitx
Reminder: Always connect the SDR device to the Raspberry Pi before running listening software.	 <u>rtl_433</u> <u>acarsdec</u> <u>Gpredict</u> <u>multimon-ng</u>

In the list, the SDRAngel software deserves special attention. Feel free to take the software in hand with the help of a vidéo or other internet resource. Fldigi and WSJT-X is not present in the list, you will just have to add these programs as explained in part 2.

Useful link on the RTL SDR key :

https://www.surviveuk.com/wp-content/uploads/2016/07/The-Hobbyists-Guide-To-RTL-SDR-Carl-Laufer.pdf Next part: Using the Raspbian Lite operating system without GUI. Command lines will be more important.



Raspberry Pi for HAM Radio Part 4

Prerequisite: Discovery of Raspberry PI Part 1 (pages 2 and 3)

Summary:

Part 4: Using the Raspbian Lite operating system without GUI.

4.1 Introduction	P. 2
4.2 Operating system setup	P. 3
4.3 Power on	P. 4
4.4 raspi-config use	P. 5
4.5 Check IP address	P. 15
4.6 Putty	P.16
4.7 Repositories update	P. 18
4.8 Backup mSD card	P. 29

Version du 5/09/2020

4.1 Introduction.

As a HAM radio, I use the Raspberry Pi in 2 situations:

- As described in the first 3 tutorials, the Raspberry PI is connected directly to a transceiver. Using VNC viewer, I control the Raspberry remotely. This allows me to perform QSO in digital mode in a remote way, elsewhere than in the radio shack.

- The Raspberry pi is exclusively dedicated to a specific application and is switched on 24 hours a day. It can be an application managing an sdr listening server like openwebrx, an APRS igate with direwolf, the reception of weather images, or simply hosting a WEB server at home.

In the 2nd situation, the permanent use of an HDMI monitor has no interest, since the management of the Raspberry PI will be done systematically on the command line via putty or, depending on the application used, via an administration WEB page hosted in the mSd card.

As a result, there is a "light" version of Raspbian that does not manage the graphical desktop environment (all installation and configuration is done on the command line). This has the advantage of not monopolizing processor resources for the management of the graphic desktop and saving the electrical energy of the nano computer.

Some developers such as MW0MWZ with pistar, (DMR hotspot management) have the excellent idea of offering a "picture" ready to use with the operating system and all the software already installed. The user only has to use a copy software like etcher, without having to perform all the tedious tasks of a complete installation.

However, not all applications using RPI are ready to use in a disk image. A large majority of applications require manual installation with the prerequisite of having a Raspbian operating system already installed and configured in the correct language.

This document will explain how to install and configure Raspbian with no Desktop environment and remind the remote connection procedure with putty. Not forgetting the procedure to save the mSd card.



4.2 Operating system setup

With your Computer, download the new Pi Imager operating system management utility for the Raspberry PI. <u>https://www.raspberrypi.org/downloads/</u>

Down	nloads
Raspbian is	s our official operating system for all models of the Raspberry Pi.
Use Raspbe	erry Pi Imager for an easy way to install Raspbian and other operating
systems to	an SD card ready to use with your Raspberry Pi:
- Raspt	perry Pi Imager for Windows
- Raspl	berry Pi Imager for macOS

- Raspberry Pi Imager for Ubuntu

After downloading and installing, select the Raspbian OS with no Desktop environment



Insert the micro Sd card into a USB reader on the PC, select the SD card reader here GENERIC USB Reader, then click on WRITE.



The Pi Imager utility will automatically download and copy the selected operating system to the mSd card. The time of the operation depends on the Internet connection, you have to be patient.

4.3 Power on

Carry out the following wiring, ending with the 5V power supply of the Raspberry.



4.4 Raspi-config use (beware french description configuration azerty keyboard)

By default, the language at startup is English, the console appears and asks you to enter the login and password.

Beware the keyboard configuration is initially in qwerty. Then run the raspi-config configuration utility.



It will be necessary to configure your own country, the language with the right character set, the keyboard, activate the SSh, and possibly configure the wifi. (here for french setup)

Ra	Raspberry Pi 4 Model B Re	v 1.2 Software Configuration Tool (raspi-config)
	<pre>1 Change User Password 2 Network Options 3 Boot Options 4 Localisation Options 5 Interfacing Options 6 Overclock 7 Advanced Options 8 Update 9 About raspi-config</pre>	Change password for the 'pi' user Configure network settings Configure options for start-up Set up language and regional settings to match your Configure connections to peripherals Configure overclocking for your Pi Configure advanced settings Update this tool to the latest version Information about this configuration tool
	<se< th=""><th>lect> <finish></finish></th></se<>	lect> <finish></finish>

Start by selecting menu 4: Location Options. (Down arrow, then enter key)

F4GOH – KF4GOH



Find the line in **GB.UTF-8 UTF-8** with the down arrow or pageDown key, uncheck it by pressing the space bar.



Find the line fr EN.UTF-8 UTF-8 with the arrow at the bottom of the keyboard, check it by pressing the space bar. (Appearance of a small star), then press enter.



Select fr_EN.UTF-8 UTF-8, then press enter to return to the main menu.

Default	locale	for	the	system	environment:	
					None C.UTF-8 fr_FR.UTF-8	
			<0k)	,		<cancel></cancel>

In case of false manipulation, press the tab key on the keyboard, this allows you to scan the different elements of the window and thus easily access <ok> and <Cancel>.

Note: The screenshots presented in this document are sometimes in French while the configuration on the HDMI monitor will be done in English. This does not change the following procedure.

Select Menu 4: Localization Options again. (down arrow, then press enter)

Raspberry Pi 4 Model B Rev	7 1.2
Raspberry Pi S1 Change User Password2 Network Options3 Boot Options4 Localisation Options5 Interfacing Options6 Overclock7 Advanced Options8 Update9 About raspi-config	Change password for the 'pi' user Configure network settings Configure options for start-up Set up language and regional settings to match your Configure connections to peripherals Configure overclocking for your Pi Configure advanced settings Update this tool to the latest version Information about this configuration tool
<sel< td=""><td>lect> <finish></finish></td></sel<>	lect> <finish></finish>

Select menu I1: Local Change (down arrow, then enter key)



Select Europe (then press enter)

Lieu géographique :	Afrique Amérique Antarctique Australie Arctique Asie Atlantique	
<0k>	Europe	↓ <annuler></annuler>

Fuseau horaire : Paris Podgorica ALL THE ME Prague Riga Rome Samara 199 Saint-Marin Sarajevo Saratov 1 <0k> <Annuler>

Select Paris (pressing the letter P on the keyboard goes faster) as time zone (then enter key)

Select menu 4: Location Options again. (down arrow, then enter key)

This time you need to configure the keyboard in azerty.



Select generic PC 105 keys. (Down arrow, then enter key)



Select Other. (Then press enter)

Configuration de keyboard-configuration
Veuillez choisir la disposition qui correspond au clavier de cette machine.
Disposition du clavier :
Anglais (Royaume-Uni)
Anglais (Royaume-Uni) - Anglais (Royaume-Uni, Colemak)
Anglais (Royaume-Uni) - Anglais (Royaume-Uni, Dvorak)
Anglais (Royaume-Uni) - Anglais (Royaume-Uni, Dvorak,
Anglais (Royaume-Uni) - Anglais (Royaume-Uni, étendu,
Anglais (Royaume-Uni) - Anglais (Royaume-Uni, internat.,
Anglais (Royaume-Uni) - Anglais (Royaume-Uni, internat., Macintosh)
Anglais (Royaume-Uni) - Anglais (Royaume-Uni, Macintosh)
Anglais (Royaume-Uni) - Polish (British keyboard)
Autre
<ok> <annuler></annuler></ok>

Select English. (Then press enter)

Configuration de keyboard-configuration La disposition des claviers varie selon les pays. Dans cer peut même exister plusieurs dispositions possibles. Veuill pays d'origine du clavier de cette machine.	tains pays, il ez choisir le
Pays d'origine du clavier :	
Féroïen Filipino Finnois Français Français (Canada) Français (Guinée) Français (République démocratique du Congo) Français (Togo)	
<ok> <annuler></annuler></ok>	

Select English again, and confirm the following steps with the enter key:

Configuration de keyboard-configuration Veuillez choisir la disposition qui correspond au clavier de cette machine.	
Disposition du clavier :	
Français	
Français - Français (azerty)	J
Français - Français (Bépo, ergonomique, façon Dvorak)	
Français - Français (Bépo, ergonomique, façon Dvorak,	
Français - Français (breton)	
Français - Français (Dvorak)	
Français - Français (Macintosh)	
Français - Français (sans touche morte Sun)	
Français - Français (touches mortes Sun)	
<ok> <annuler></annuler></ok>	



Configuration de keyboard-configuration La touche « compose » (encore appelée « touche multi ») sert à indiquer que les touches utilisées ensuite doivent être combinées de façon à produire un caractère qui n'existe pas sur le clavier.
Sur les consoles en mode texte, la touche « compose » ne fonctionne pas en mode Unicode. Si l'on n'est pas en mode Unicode, indépendamment de ce que vous avez choisi ici, vous pouvez toujours utiliser la combinaison Ctrl+point comme touche « compose ».
Touche « compose » :
Pas de touche « compose »†Touche Alt de droite (AltGr)ITouche Ctrl de droite↓
<ok> <annuler></annuler></ok>


Back to the main menu, select menu 4: Location Options again.

This is the moment to configure the country of use of the WIFI

I1 C I2 C I3 C I4 C	hange hange hange	Local Timez Keybo Wi-fi	e one ard Layout Country	Set up Set up Set th	language timezone e keyboar e legal c	and regio to match d layout t	onal sett your loc to match	ings to r ation your keyk	natch y board
		Select FI FJ FK FM FO GA GB GD GE	the count: Finland Fiji Falkland : Micronesi: Faroe Isl: France Gabon Britain (1 Grenada Georgia <ok< th=""><th>ry in w Islands ands UK)</th><th>hich the</th><th>Pi is to i</th><th>be used</th><th>↑ 1226 1226 - 1226 1226 1226 1226 1226 12</th><th></th></ok<>	ry in w Islands ands UK)	hich the	Pi is to i	be used	↑ 1226 1226 - 1226 1226 1226 1226 1226 12	
	W	i-fi c	ountry set	to FR	<0k>				

Back to the main menu, select Menu 5: Interfacing Options again.

Raspberry Pi S	Software Configuration Tool (raspi-config)
<pre>1 Change User Password 2 Network Options 3 Boot Options 4 Localisation Options 5 Interfacing Options 6 Overclock 7 Advanced Options 8 Update 9 About raspi-config</pre>	Change password for the 'pi' user Configure network settings Configure options for start-up Set up language and regional settings to match your Configure connections to peripherals Configure overclocking for your Pi Configure advanced settings Update this tool to the latest version Information about this configuration tool
<se]< td=""><td>lect> <finish></finish></td></se]<>	lect> <finish></finish>

Activate SSH by selecting the line, then press enter.

	F	laspbe	erry Pi	Software	e Configuration Tool (raspi-config)
P1	Camera		Enable/	Disable	connection to the Raspberry Pi Camera
P2	SSH		Enable/	'Disable	remote command line access to your Pi using
P3	VNC		Enable/	'Disable	graphical remote access to your Pi using Rea
P4	SPI		Enable/	'Disable	automatic loading of SPI kernel module
P5	I2C		Enable/	Disable	automatic loading of I2C kernel module
P6	Serial		Enable/	Disable	shell and kernel messages on the serial conn
P7	1-Wire		Enable/	Disable	one-wire interface
P8	Remote	GPIO	Enable/	Disable	remote access to GPIO pins
			<se< td=""><td>elect></td><td><back></back></td></se<>	elect>	<back></back>

Note: When using sensors or actuators connected directly to the 40-pin GPIO interface, you often have to return to this menu to activate the communication BUS for the project. This can be for example a mini weather station using a BME280 sensor, or simply the camera on its dedicated connector.

Would you like the SSH serv	er to be enabled?	The SSH server is enabled
Caution: Default and weak g when SSH is enabled!	asswords are a security risk	KOIC>
<oui></oui>	<non></non>	

Back to the main menu, select menu 2: Network Options.



F4GOH – KF4GOH

Select Hostname. (Then enter key)

N1	Hostname	Set the visible name for this Pi on a network
N2	Wi-fi	Enter SSID and passphrase
NЗ	Network interface names	Enable/Disable predictable network interface na
N4	Network proxy settings	Configure network proxy settings

Appears an alert: lowercase characters, no spaces, etc.

Simple, I took my callsign as a domain name

Please enter a hostname	
f4goh	
<0k>	<annuler></annuler>

N1	Hostname	Set the visible name for this Pi on a network
Ν2	Wi-fi	Enter SSID and passphrase
NЗ	Network interface names	Enable/Disable predictable network interface na
N4	Network proxy settings	Configure network proxy settings

Back to the main menu, select again menu 2: Network Options, then Wi-fi,

N1	Hostname	Set the visible name for this Pi on a network
Ν2	Wi-fi	Enter SSID and passphrase
NЗ	Network interface names	Enable/Disable predictable network interface na
N4	Network proxy settings	Configure network proxy settings

This step is optional if the internet connection is via Wi-fi.

It is necessary to know the name of your access point (ADSL Box), its password precisely and with the character

Please enter SSID	Please enter passphrase. Leave it empty if none.	
liveboxE0xx	****	
<ok> <annuler></annuler></ok>	<ok> <annuler></annuler></ok>	



The basic configuration is finally completed, a restart is required.

Raspberry Pi	Software Configuration Tool (raspi-config)
1 Change User Password	Change password for the 'pi' user
2 Network Options	Configure network settings
3 Boot Options	Configure options for start-up
4 Localisation Options	Set up language and regional settings to match your
5 Interfacing Options	Configure connections to peripherals
6 Overclock	Configure overclocking for your Pi
7 Advanced Options	Configure advanced settings
8 Update	Update this tool to the latest version
9 About raspi-config	Information about this configuration tool
<se< th=""><th>elect> <finish></finish></th></se<>	elect> <finish></finish>



The console appears and asks you to enter the login and password.



To change the default password, simply go to menu 1 of raspi-config (Change User Password).

On the PC, open the command prompt, type the ping command followed by the domain name chosen on page 13.

With the Raspberry Pi, display the IP address with the ifconfig command. The IP address must match (e.g. 192.168.1.145).



Note :

eth0 corresponds to the wired interface by Ethernet cable; lo : is the IP address of the local loop always 127.0.0.1 ;

wlan0: is the WIFI interface.



Download and install putty <u>https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html</u> Then, in the Translation menu, check the **UTF-8** character set.



Type the domain name or IP address of the RPI, then Open

PuTTY Configuration PuTT Category: Session Basic options for your PuTTY session Session Category: Session Session Sectify the destination you want to connect to Nost reame (or n r a) dress) Port 192.168.1.145 22 Connection type: Raw Telnet Nindow Appearance Behaviour Translation Selection Colours Connection Pito Proxy Proxy Proxy Proxy Proxy Putto-sdr serial Puto-sdr serial Puto-sd	Basic options for your PuTTY session gging al yboard I
Category: Basic options for your PuTTY session Category: Category: Category: Category: Category: Category: Category: Category: Category: Category: Specify the destination you want to connect to Nos. Ivanie (or nr a dress) Port 192.168.1.145 22 Connection type: Raw Telnet Rilogir SSH Serial Connection type: Category: Port 192.168.1.145 22 Connection type: Raw Telnet Rilogir SSH Serial Connection Pit4 Connection Pit4 Connection Colurs Connection Pit4 Connection Colurs Connection Pit4 Colurs Connection Colurs Connection Colurs Connection Pit4 Colurs Connection Colurs Connection Colurs Colurs Connection Colurs Connection Colurs Connection Colurs Connection Colurs Colurs Connection Colurs Connection Colurs Colurs Colurs Connection Colurs Connection Colurs Connection Colurs Col	n Basic options for your PuTTY session gging Specify the destination you want to connect to al Use New (or IP address) Port yoard [4goh 22
Riogin Image: SSH Serial Close window on exit: Image: Always Never Onen Cancel	atures Connection type: w Raw Telnet Rlogin SSH Serial pearance haviour anslation lection lours ction ta mpr pluto-sdr serial pluto-sdr serial s



Enter the usual login and password.

Login :	рі
Password :	raspberry



4.7 Repositories update

The sudo apt-get update command updates the list of files available in the APT repositories present in the configuration file /etc/apt/sources.list. Running this command regularly is a good practice, in order to keep your list of available packages up to date and hope to have the latest software versions. The same goes for the upgrade command to update obsolete packages in the Rasberry Pi.

sudo apt update sudo apt upgrade

Execute this command in Putty

```
pi@f4goh:~ $ sudo apt update
Réception de :1 http://raspbian.raspberrypi.org/raspbian buster InRelease [15,0
kB]
Réception de :2 http://archive.raspberrypi.org/debian buster InRelease [25,1 kB]
Réception de :3 http://raspbian.raspberrypi.org/raspbian buster/main armhf Packa
ges [13,0 MB]
Réception de :4 http://archive.raspberrypi.org/debian buster/main armhf Packages
[327 kB]
    [3 Packages 3□349 kB/13,0 MB 26%]
```

```
pi@f4goh:~ $ sudo apt upgrade
Lecture des listes de paquets... Fait
Construction de l'arbre des dépendances
Lecture des informations d'état... Fait
Calcul de la mise à jour... Fait
Les NOUVEAUX paquets suivants seront installés :
  libfl2
Les paquets suivants seront mis à jour :
  apt apt-utils base-files binutils binutils-arm-linux-gnueabihf
  binutils-common bluez curl distro-info-data firmware-atheros
  firmware-brcm80211 firmware-libertas firmware-misc-nonfree firmware-realtek
  fuse iputils-ping libapt-inst2.0 libapt-pkg5.0 libbinutils libcurl4 libfuse2
  libgnutls30 libicu63 libldap-2.4-2 libldap-common libpam-chksshpwd
 libpam-modules libpam-modules-bin libpam-runtime libpam-systemd libpamOg
 libssl1.1 libsystemd0 libudev1 openssl raspi-config rpi-eeprom
  rpi-eeprom-images rpi-update systemd systemd-sysv tzdata udev wpasupplicant
44 mis à jour, 1 nouvellement installés, 0 à enlever et 0 non mis à jour.
Il est nécessaire de prendre 43,1 Mo dans les archives.
Après cette opération, 40744 ko d'espace disque supplémentaires seront utilisés.
Souhaitez-vous continuer ? [O/n]
```



4.8 Backup mSD card

Take advantage of a break or lunch to make a backup of the operating system. This time there is no longer the ease of the graphic desktop to backup the operating system. However, it is possible to make the backup in command line, according to the site: <u>framboise314</u>

Start by installing the git utility for retrieving computer projects on github

sudo apt install git

pi@f4goh:~ \$ sudo apt install git
Lecture des listes de paquets Fait
Construction de l'arbre des dépendances
Lecture des informations d'état Fait
Les paquets supplémentaires suivants seront installés :
git-man libcurl3-gnutls liberror-perl
Paquets suggérés :
git-daemon-run git-daemon-sysvinit git-doc git-el git-email git-gui gitk
gitweb git-cvs git-mediawiki git-svn
Les NOUVEAUX paquets suivants seront installés :
git git-man libcurl3-gnutls liberror-perl
0 mis à jour, 4 nouvellement installés, 0 à enlever et 0 non mis à jour.
Il est nécessaire de prendre 60137 ko dans les archives.
Après cette opération, 32,9 Mo d'espece disque supplémentaires seront utilisés.
Souhaitez-vous continuer ? [O/n]



- Insert a reader with its blank mSD card into a free USB port on the Raspberry PI.



The following command starts the backup.

sudo ./rpi-clone sda

```
pi@f4goh:~/rpi-clone $ sudo ./rpi-clone sda
                                    Destination disk: sda 15.5GB
Booted disk: mmcblk0 15.5GB
Part Size FS Label Part Size FS Label
1 /boot 256.0M fat32 --
                                            14.4G fat32 --
        14.2G ext4 rootfs
2 root
 = Initialize: IMAGE partition table - partition number mismatch: 2 -> 1 ==
1 /boot (52.0M used) : MKFS SYNC to sda1
2 root
                   (1.3G used) : RESIZE MKFS SYNC to sda2
                  : no.
Run setup script
Verbose mode
                     : no.
** WARNING **
               : All destination disk sda data will be overwritten!
Initialize and clone to the destination disk sda? (yes/no): yes
Optional destination ext type file system label (16 chars max):
Initializing
 Imaging past partition 1 start.
 => dd if=/dev/mmcblk0 of=/dev/sda bs=1M count=8 ...
 Resizing destination disk last partition ...
   Resize success.
 Changing destination Disk ID ...
 => mkfs -t vfat -F 32 /dev/sda1 ...
  => mkfs -t ext4 /dev/sda2 ...
Syncing file systems (can take a long time)
Syncing mounted partitions:
 Mounting /dev/sda2 on /mnt/clone
 => rsync // /mnt/clone with-root-excludes ...
 Mounting /dev/sda1 on /mnt/clone/boot
 => rsync /boot/ /mnt/clone/boot
                                . . .
Editing /mnt/clone/boot/cmdline.txt PARTUUID to use 290628bd
Editing /mnt/clone/etc/fstab PARTUUID to use 290628bd
Done with clone to /dev/sda
  Start - 19:34:27 End - 19:37:33 Elapsed Time - 3:06
Cloned partitions are mounted on /mnt/clone for inspection or customizing.
Hit Enter when ready to unmount the /dev/sda partitions .
 unmounting /mnt/clone/boot
                                        Touche entrée
 unmounting /mnt/clone
             _____
pi@f4goh:~/rpi-clone $
```

Next part: Recall some elementary commands in the console, then decode a WSPR signal with an rtl-sdr key without using WSJT-X.

Next part: Installation and configuration of a sdr listening server. (openwebrx)



Raspberry Pi for HAM Radio Part 5

Prerequisite: Raspberry PI Discovery Part 4

Summary:

Part 5: Basic commands, file access rights and WSPR.

5.1 Introduction	P. 2
5.2 Linux structure folders	P. 3
5.3 The basic commands	P. 4
5.4 Access rights on files	P. 9
5.5 The super user	P. 11
5.6 RTL-SDR key Installation	P. 12
5.7 WSPR decoding	P. 16
5.8 Weather stations decoding	P. 19

Version du 5/09/2020 V1.0



5.1 Introduction.

The objective of this tutorial is to be able to get by with a minimum of Linux command lines, i.e. :

- Access and explore the different directories ;
- Create a directory,
- Create, modify,
- Copy, move or delete a file,
- Changing the rights of a file
- Make a file executable and know how to execute it ;
- Switch to super user mode.

These commands will be seen through concrete examples. This can serve as a basis for the following, the interest being not to feel helpless when installing projects around the rtl-sdr receiver key.

All the following manipulations will be done in SSh connection with PuTTY. No more need for HDMI screen or keyboard/mouse.



Category:		login as: pi
Catenory Session Logging Terminal Keyboard Bell Features Window Appearance Behaviour Translation Selection Colours Connection Data Proxy Telnet Riogin SSH Serial	Basic options for your PuTTY session Specify the destination you want to connect to Handback Fidgoh 22 Connection type: Raw Telnet Raw Telnet Raw Telnet Raw Telnet Ray Senal Load Save Pluto-sdr senal Pluto-sdr senal Pluto-sdr senal Pluto-sdr senal Pluto-sdr senal Pluto-sdr senal Pluto-sdr senal	<pre>login as: pi pi@192.168.1.145's password: Taspberry Linux f4goh 4.19.97-v7l+ #1294 SMP Thu Jan 30 13 The programs included with the Debian GNU/Linux the exact distribution terms for each program as individual files in /usr/share/doc/*/copyright. Debian GNU/Linux comes with ABSOLUTELY NO WARRAN permitted by applicable law. Last login: Thu May 14 19:54:02 2020 from 192.10 SSH is enabled and the default password for the This is a security risk - please login as the 'y a new password. pi@f4goh:~ \$</pre>

5.2 Linux structure folders

When we talk about tree structure, we are talking about hierarchy and the way files and directories are organized on an operating system. The organization of folders on a computer is often compared to a tree. The base of your tree is what is called the "root".

For example, on Windows, the root is often "C:\" which corresponds to the hard drive "C".

On Linux, the root is "/". A sequence of files starting with "/" starts from the base of your tree structure.



When installing Raspbian, the user pi is the default login. It is always located in home. This allows you to create other users.

- -/= Root, it contains the main directories
- /bin => Executables essential to the system, usable by all users (Is pwd cp)
- /boot => files allowing Linux to boot
- /dev => Entry point for all peripherals (hard disk, screen, partition, TTY consoles)
- /etc => contains the commands and files needed by the system administrator
- /home => User's personal directory
- /lib => contains the shared libraries essential to the system at boot time
- /media => contains mounting points for temporary partitions (USB sticks, data partitions)

- /opt => Generic directory for the installation of programs compiled by the administrator (specific software not present in the repositories)

- /proc => does not physically exist on a disk, it is created by the kernel in memory. This partition is used to give information about the system.

- /root => Administrator's home directory.
- /sbin => Contains essential system programs that can be used by the admin only.
- /srv => This is a data directory for various services (storage of FTP account documents, or web site pages).
- /tmp => Temporary files directory
- /usr => Contains installed programs (/usr/bin) with their libraries (/usr/lib)

- /var => contains variable data (log files) but sometimes databases (/var/lib/mysql) and website pages (/var/www/html)

In the rest of the tutorial we will always use pi as user.

F4GOH – KF4GOH 5.3 The basic commands

Unix commands are a word or a phrase that indicates a sequence of commands to execute on the computer, they consist of a name, can take one or more options and parameters.

pwd displays the path to the directory where the user is located. Its name in English means "print working directory". This command is very useful when you don't know which directory you are in.



mkdir allows to create directories. The command is an abbreviation of make directory.

pi@f4goh:~ \$ mkdir images	Crée un répertoire image
pi@f4goh:~ \$ mkdir docume	Crée un répertoire documents
pi@f4goh:~ \$	

1s is a command to list the contents of a directory (abbreviation of list in English).

It is used in the form: Is {options} {parameters}

	ls
pi@f4goh:~ \$ ls	Lists the contents of the current directory (pi
documents images rpi-clone	directory). The two previously created directories
pi@f4goh:~ \$ <mark>-</mark>	and the rpi-clone backup utility installed in part 4.

Nevertheless this command lists the files in my current directory without any additional information, so I need to give it an option to fix this problem. I will give it the "-I" option (Lima hyphen). Note that all options in all commands always start with a '-'.

15 -1	
<pre>pi@f4goh:~ \$ ls -l total 12 drwxr-xr-x 2 pi pi 4096 mai 16 15:53 documents drwxr-xr-x 2 pi pi 4096 mai 16 15:53 images drwxr-xr-x 3 pi pi 4096 mai 14 19:24 rpi-clone pi@f4goh:~ \$</pre>	Lists the contents of the current directory with more details.



cd (abbreviation for change directory) is a command to change the current directory.

cd documents

Note :

In the command line, you must use the auto-completion with the TAB key to the maximum. In the example below, the goal is to move in the documents directory.

pi@f4goh:~ \$ cd d	I start by typing cd, space key, letter d then the tab key.	Tab
<pre>pi@f4goh:~ \$ cd documents/ pi@f4goh:~/documents \$</pre>	The word "documents" appears directly without having to type it. Simply confirm with the enter key.	

pwd

pi@f4goh:~/documents \$ pwd	documents
/home/pi/documents pi@f4goh:~/documents \$	/home/pi/documents

To go back, always use the command cd, space key, point point.

cd ..

<pre>pi@f4goh:~/documents \$ cdbash: cd : commande introuvable</pre>	J'ai oublié un espace entre cd et les deux points !!
pi@f4goh:~/documents \$ cd pi@f4goh:~ \$ <mark>-</mark>	Voila, cela fonctionne.

I now move to the images directory

\mathbf{cd}	images
---------------	--------



Now I want to go directly back to the documents directory.

1st possibility -> relative path :



2nd possibility -> absolute path :

cd /home/pi/documents

pi@f4goh:~/images \$ cd /home/pi/documents/ I move in the documents directory pi@f4goh:~/documents \$ taking as reference the root /.

We will now create a text file in the documents directory with the nano utility.

Nano is a basic text editor that allows you to edit plain text files, without formatting (bold, italic, underline...). Under Windows, an identical text editor is available, the Notepad.

nano essai.txt

pi@f4goh:~/documents \$ nano essai.txt

Creates and edits the essai.txt file

Type any text, e.g. hello (bonjour).

🛃 pi@f4goh: ~/	/documents			
GNU nano	3.2	essai.txt	;	Modifié 🔺
bonjour				
<mark>^G</mark> Aide <mark>^X</mark> Quitter	<mark>^O</mark> Écrire <mark>^R</mark> Lire fich.	^W Chercher ^\ Remplacer	^{^K} Couper <mark>^U</mark> Coller	^J Justifier ^T Orthograp. ▼



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Save the file using the Ctrl + o keys.

Tab	а	z	е	r	t	У	u	i	0	p	^ [£] \$		
Verr. maj	q	s	d	f	g	h	j	k	1	m	%µ ù	*	
Maj	>_	w	x	с	v	b	n	?		5	, Maj	1	Supp

ſ	சூ pi@f4goh: ~/documents			
	GNU nano 3.2	essai.txt	Modifié 🔺	
	bonjour			Enter key to confirm the recording.
	Nom du fichier à écrire: essai.txt			
l	[^] G Aide M-D Format DOS [^] C Annuler M-M Format Mac	M-A Ajout (à la fiM-B Copi M-P Ajout (au débu <mark>^T</mark> Parco	e de sécu. urir 🗸	

Exit the editor using Ctrl + x.

Éch 2	1	& 2	é ³	. 4	. 5	(6.	- ⁷ è	8	9 ç	0 à	۰)	+=		
Tab	а	z	e	r	t	У	u	i	0	р	^	£		
Verr. maj	q	s	d	f	g	h	j	k	1	m)% ù	۴ ⁴] ←	_
Maj	> <	w	x	c	v	b	n	?	•	7.	§ !	Maj	t	Suppr
Ctrl	A	dt					Alto	ir 🗖	Fn	C	:trl	+	t.	-

Lists the contents of the directory, the file essai.txt appears.

ls -1





cp (in reference term copy) is a command to copy files and directories.

	I want to cop	v the essai.txt file to the	"images" directory
--	---------------	-----------------------------	--------------------

<pre>pi@f4goh:~/documents \$ cp essai.txt/images</pre>	Copy the essai.txt file indicating the
pi@f4goh:~/documents \$ ls/images/	destination directory.
essai.txt	Lists the contents of the image directory to
	see if the file is well copied.

mv (in reference to the term move) allows you to move files and directories. It also allows to rename a file or a directory.

I want to move the essai.txt file to the /home/pi directory using the absolute path.

<pre>pi@f4goh:~/documents \$ mv essai.txt /home/pi/ pi@f4goh:~/documents \$ ls pi@f4goh:~/documents \$</pre>	Move the essai.txt file indicating the destination directory.
	see if the file is missing

I now go back to the /home/pi directory.

To go back to the base directory "/home/pi", always use the command cd, space key, point point.

cd
OR
cd /home/pi
Or go back to the default directory
cd ~

rm (in reference to remove) is a command to delete files and directories.

I delete the documents and images directory

rm -r documents rm -r images				
pi@f4goh:~ \$ rm -r documents/	Deleting both directories			

pigi4gon:~ \$ rm -r documents/	Deleting both directories
pi@f4goh:~ \$ rm -r images/	Lists the image content to see if both directories
pi@f4goh:~ \$ ls	are deleted
essai.txt rpi-clone	
pi@f4goh:~ \$	

Note: the dash -r option is mandatory for a directory. For a file there is no need for a dash -r. The file essai.txt is used for the rest and will be deleted later.

F4GOH – KF4GOH	Tutorial
5.4 Access rights on files	

On a Linux system, every file and folder have an owner and rights. Users are grouped into 3 groups: Owner (u), group (g) and other users (o). These groups make it possible to give different rights to each user. The different rights that can be granted are: read (r, 4), write (w, 2) and execute (x, 1).

Les différents droits				
	File	Directory		
Read	See the content	List content		
Write	Modify the content	Add or delete an item		
Execute	Execute	Getting through		

Let's observe the access rights of the file essai.txt

pi@f4goh:~ \$ ls -l essai.txt r--r-- 1 pi pi 10 mai 16 16:57 essai.txt i@f4goh:~ \$

_	read	write	vrite not read not n execute read write exe		not execute	read	not write	not Execute		
(File)	r	- W		r	-	-	r	-	-	
d	4	2	0	4	0	0	4	0	0	
(Folder)	Ov	wner Use	r (u)		Group (g	1)	Other users (o)			

The file essai.txt is in read and write access for its owner, i.e. the user whose login is pi. On the other hand, the file is read-only for the group and the other users.

The modification of the rights of a file or a directory is done in two ways: Absolute or relative.

Example of absolute change:

chmod 660 essai.txt

pi@f4goh:~		ls -1	essai.txt
-rw-rr	1	pi pi	10 mai 16 16:57 essai.txt
pi@f4goh:~		chmod	660 essai.txt
pi@f4goh:~		ls -1	essai.txt
-rw-rw	1	pi pi	10 mai 16 16:57 essai.txt
pi@f4goh:~			



Each digit of the number 660 is encoded in octal.

_	read	write	not execute	read	write	not execute	Not read	Not write	not execute X 0	
(File)	r	W	X	r	W	X	-	-		
d	4	2	0	4	2	0	0	0		
(Folder)	Ov	vner Use	r (u)		Group (g	g)	Other users (o)			

Example of relative change: (we add "+" execute rights to the owner)

chmod u+x essai.txt

pi@f4goh:~ \$ ls -l essai.txt	The test file has become executable.
-rw-rw 1 pi pi 10 mai 16 16:57 essai.txt	When using the 1 c command it is colored
pi@f4goh:~ \$ chmod u+x essai.txt	
pi@f4goh:~ \$ ls -l essai.txt	green (even if it can't actually run, it's still
-rwxrw 1 pi pi 10 mai 16 16:57 essai.txt	a text file, this is just taken as an example).
pi@f4goh:~ \$	

Note: It often happens that a file is downloaded and cannot be executed because it does not have the necessary rights. The chmod command solves the problem.

Delete the essai.txt file

rm essai.txt

Exercise: From the table below, give the associated linux commands in order to modify the rights of the .txt file.

-	read	write	not execute	read	write	not execute	Not read	Not write	not execute X	
(File)	r	W	X	r	W	X	-	-		
d	4 2		1	4	0	1	0	0	0	
(Folder)	Ov	vner Use	r (u)		Group (g	3)	Other users (o)			

chmod 750 fichier.txt



5.5 The super user

On the Raspberry Pi, when the user uses the "pi" login, he only has access to the /home/pi directory and the subdirectories he created himself. The user pi does not have access to other directories (for example /bin, /boot, etc...).



To modify files for example in the /bin directory or to install new programs, the user "pi" will have to enter the sudo command systematically. sudo (abbreviation of substitute user do) is a command allowing a user to run a command as an administrator.

However, it is possible to switch to super user mode easily and there will be no need to type the sudo command systematically.

sudo su							
<pre>pi@f4goh:~ \$ sudo su root@f4goh:/home/pi# ls rpi-clone root@f4goh:/home/pi# exit exit pi@f4goh:~ \$</pre>	In super user or root mode, it has no more colors and the command prompt ends with # instead of \$. To exit super user mode, exit cmd.						

OV	п.	+
CA	-	

Warning: In super user mode, you really need to know what you are doing. A file modification or deletion is irreversible.



5.6 RTL-SDR key Installation

Retrieve the official files:

git clone https://github.com/osmocom/rtl-sdr.git



Install the libraries.

sudo apt install build-essential cmake usbutils libusb-1.0-0-dev

pi@raspberrypi:~/rtl-sdr/build \$ sudo apt install build-essential cmake usbutils
libusb-1.0-0-dev
Lecture des listes de paquets Fait
Construction de l'arbre des dépendances
Lecture des informations d'état Fait
build-essential est déjà la version la plus récente (12.6).
usbutils est déjà la version la plus récente (1:010-3).
Les paquets suivants ont été installés automatiquement et ne sont plus nécessair
es :
libmicrodns0 libqt5charts5 xlog-data
Veuillez utiliser « sudo apt autoremove » pour les supprimer.
Les paquets supplémentaires suivants seront installés :
cmake-data libjsoncpp1 librhash0 libusb-1.0-doc libuv1
Paquets suggérés :
cmake-doc ninja-build
Les NOUVEAUX paquets suivants seront installés :
cmake cmake-data libjsoncpp1 librhash0 libusb-1.0-0-dev libusb-1.0-doc
libuv1
0 mis à jour, 7 nouvellement installés, 0 à enlever et 0 non mis à jour.
Il est nécessaire de prendre 40578 ko dans les archives.
Après cette opération, 23,6 Mo d'espace disque supplémentaires seront utilisés.
Souhaitez-vous continuer ? [O/n]

Type these commands in the order :

cd rtl-sdr

mkdir build

cd build

cmake -DINSTALL_UDEV_RULES=ON -DDETACH KERNEL DRIVER=ON ../

pi@raspberrypi:~ \$ cd rtl-sdr/
pi@raspberrypi:~/rtl-sdr \$ mkdir build
pi@raspberrypi:~/rtl-sdr \$ cd build/
pi@raspberrypi:~/rtl-sdr/build \$ cmake -DINSTALL_UDEV_RULES=ON -DDETACH_KERNEL_D
RIVER=ON/
The C compiler identification is GNU 8.3.0
Check for working C compiler: /usr/bin/cc
Check for working C compiler: /usr/bin/cc works
Detecting C compiler ABI info
Detecting C compiler ABI info - done
Detecting C compile features
Detecting C compile features - done
Build type not specified: defaulting to release.
Extracting version information from git describe
Looking for pthread.h
Looking for pthread.h - found

sudo make install



sudo ldconfig

	Set runtime	path of "/usr/local/bin/rtl_fm" to ""
	Installing:	/usr/local/bin/rtl_eeprom
	Set runtime	<pre>path of "/usr/local/bin/rtl_eeprom" to ""</pre>
	Installing:	/usr/local/bin/rtl_adsb
	Set runtime	<pre>path of "/usr/local/bin/rtl_adsb" to ""</pre>
	Installing:	/usr/local/bin/rtl_power
	Set runtime	<pre>path of "/usr/local/bin/rtl_power" to ""</pre>
pi(]raspberrypi	:~/rtl-sdr/build \$ sudo ldconfig
pi(] raspberrypi	:~/rtl-sdr/build \$

sudo nano /etc/modprobe.d/rtlsdr-blacklist.conf

pi@raspberrypi:~/rtl-sdr/build \$ sudo nano /etc/modprobe.d/rtlsdr-blacklist.conf



blacklist dvb_usb_rtl28xxu
blacklist rtl2832
blacklist rtl2830
blacklist dvb_usb_rtl2832u
blacklist dvb_usb_v2
blacklist dvb_core

Copy and paste the above list in the nano editor. Reminder right click: to paste the text in the nano editor.



Save the file using the Ctrl + o keys, then the editor using Ctrl + x. enter key to validate the recording.

Éch 2	1	& 2	é ³	. 4	. 5	(- 7	è	8	9 ç	0 à)	+=	∫ ←	
Tab	а	Z	е	r	t	У	u	i	C)	р	^	£ \$		
Verr. maj	q	S	d	f	g	h	j		k	I.	m	%	ù ^µ ,	÷	
Maj	> <	w	x	с	۷	b	n	?	.] •	;	1:	§ !	Maj	Ť	Suppr
Ctrl 🛤	A	lt					A	ltGr	٦	Fn	(Ctrl	+	1÷	→

Restart the Raspberry PI: pi@raspberrypi:~/rtl-sdr/build \$ sudo reboot

sudo reboot

Verification: Plug the rtl-sdr key into a USB port on the Raspberry Pi. Connect the rtl-sdr key to the Raspberry Pi on a free USB port.



Check the presence of the rtl-sdr key:

With LXTerminal or Putty, type the following command line :

lsusb

Locate the rtl-sdr key: RTL238 DVB-T

Raspberry Pi 3 :

pi@raspberrypi:~ \$ lsusb												
Bus	001	Device	004:	ID	0bda:2838	Realtek Semiconductor	Corp.	RTL2838 DVB-T				
Bus	001	Device	003:	ID	0424:ec00	Standard Microsystems	Corp.	SMSC9512/9514 Fast				
Ethe	ernet	t Adapte	er									
Bus	001	Device	002:	ID	0424:9514	Standard Microsystems	Corp.	SMC9514 Hub				
Bus	001	Device	001:	ID	1d6b:0002	Linux Foundation 2.0	root h	ub				

Raspberry Pi 4 :

pi@ı	pi@raspberrypi:~ \$ lsusb							
Bus	002	Device	001:	ID	1d6b:0003	Linux Foundation 3.0 root hub		
Bus	001	Device	003:	ID	0bda:2838	Realtek Semiconductor Corp. RTL2838 DVB-T		
Bus	001	Device	002:	ID	2109:3431	VIA Labs, Inc. Hub		
Bus	001	Device	001:	ID	1d6b:0002	Linux Foundation 2.0 root hub		

With LXTerminal or Putty, type the following command line : (be careful, underscore key)

rtl test

The rtl-sdr key should be recognized, if not, disconnect and reconnect the key and restart the test.



Exit the program by pressing the Ctrl key and the c key simultaneously (Ctrl+c)

If rtl_test displays this message lost at least 112 bytes repeatedly, reinstall the program using the manual method.



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5.7 WSPR decoding

The objective is to decode the frames received in WSPR over 40 meters and to transfer them to the WSPR server, without using the WSJT-X software.



Below is an example of reception over a 24-hour period.

Prerequisite: To have installed the drivers of the rtl-sdr key previously.

sudo apt-get install libfftw3-dev curl libcurl4-gnutls-dev ntp

It's better to copy and paste than to retype everything. (See part 2, page 4)



git clone https://github.com/Guenael/rtlsdr-wsprd

```
pi@f4goh:~ $ git clone https://github.com/Guenael/rtlsdr-wsprd
Clonage dans 'rtlsdr-wsprd'...
remote: Enumerating objects: 123, done.
remote: Total 123 (delta 0), reused 0 (delta 0), pack-reused 123
Réception d'objets: 100% (123/123), 217.19 KiB | 774.00 KiB/s, fait.
Résolution des deltas: 100% (73/73), fait.
pi@f4goh:~ $
```

cd rtlsdr-wsprd

What are the files in the rtlsdr-wsprd directory?

```
ls
```

There is no executable file otherwise it would be green.

pi@f4goh:~ \$ cd rtlsdr-wsprd/									
pi@f4goh:~/rtlsdr-wsprd \$ ls									
fano.c	nhash.c	rtlsdr_wsprd.h	wsprd_utils.c						
fano.h	nhash.h	tab.c	wsprd_utils.h						
Makefile README.md		wsprd.c	wsprsim_utils.c						
metric_tables.h	rtlsdr_wsprd.c	wsprd.h	wsprsim_utils.h						
pi@f4goh:~/rtlsdr-wsprd \$									

Compilation of the program.

make

Is an executable file generated?

ls

Yes, the file is in green (rtlsdr_wsprd)

pi@f4goh:~/rtlsdr-wsprd \$ ls							
fano.c	nhash.c	rtlsdr_wsprd.c	wsprd.c	wsprd_utils.o			
fano.h	nhash.h	rtlsdr_wsprd.h	wsprd.h	wsprsim_utils.c			
fano.o	nhash.o	rtlsdr_wsprd.o	wsprd.o	wsprsim_utils.h			
Makefile	README.md	tab.c	wsprd_utils.c	wsprsim_utils.o			
metric_tables.h	rtlsdr_wsprd	tab.o	wsprd_utils.h				
pi@f4goh:~/rtlsdr-wsprd \$							

Tutorial

Running the file: point, slash, rtlsdr_wsprd



./rtlsdr wsprd

You have to pass parameters to the program in order to run it with a callsign

Example for the 40 meters band, frequency 7.0386MHz, callsign f4goh, locator jn07dv, gain 29 db, frequency offset 10 hertz, direct sampling for HF (-d 2) Q input.

sudo ./rtlsdr_wsprd -f 7.0386M -c F4GOH -1 JN07DV -g 29 -o -10 -d 2

Résultat :

Pi@f4goh: ~/rtlsdr-wsprd	
pi@f4goh:~/rtlsdr-wsprd \$ sudo ./rtlsdr wsprd -f 7.0386M -c F4GOH -l JN07DV -g 2	Mier ou Nord
9 -o -10 -d 2	CRORM Demo
Found 1 device(s):	Royau DL6CA
0: Realtek, RTL2838UHIDIR, SN: 00000001	
	G7SOQ PA9HR J
Using device 0: Generic RTL2832U OEM	
Found Rafael Micro R820T tuner	CONTRACTOR POTRE
Enabled direct sampling mode, input 2	G8GRO
	Allenygn
Starting rtlsdr-wsprd (2020-05-22, 18:53z) Version 0.2	F170M DL3AO
Callsign : F4GOH	F4GOH
Locator : JN07DV	oses (n) for de <mark>HB9DOZ</mark> sht p
Dial freq. : 7038599 Hz	
Real freq. : 7038589 Hz	IZ2EEQ
PPM factor : 0	France
Gain : 29 dB	
Wait for time sync (start in 43 sec)	
Spot + 11 27 0 42 7 040100 0 < > THATWO 27	
Spot $-12.0 - 2.0 - 7.04005 - 0.0300 23$	Ital
Spot - 12.58 0.60 7.040400 0 CTTF JOOD 20	EA4URA Barcalono
Spot $-20.83 - 0.31 - 7.04019 - 0.4 > 105019 23$	a barceione
Spot: $-21.661.67$ 7.04058 0 G7500 T092 23	al May 10
Spot • 0.47 -1.49 7.040102 0.62JP 1070.37	Espano Tyrmenier

5.8 Weather stations decoding

Prerequisite: To have installed the drivers of the rtl-sdr key previously.

Download with git the rtl_433 program.

git clone https://github.com/merbanan/rtl 433.git

pi@f4goh:~ \$ git clone https://github.com/merbanan/rtl_433.git								
Clonage dans 'rtl 433'								
remote: Enumerating objects: 14, done.								
remote: Counting objects: 100% (14/14), done.								
remote: Compressing objects: 100% (14/14), done.								
remote: Total 14841 (delta 3), reused 1 (delta 0), pack-reused 14827								
Réception d'objets: 100% (14841/14841), 5.08 MiB 1.47 MiB/s, fait.								
Résolution des deltas: 100% (11480/11480), fait.								
pi@f4goh:~ \$ ls								
rpi-clone rtl_433 rtl-sdr rtlsdr-wsprd								

cd rtl_433/ mkdir build cd build cmake ../

pi@f4goh:~ \$ ls								
rpi-clone rtl_433 rtl-sdr rtlsdr-wsprd								
pi@f4goh:~ \$ cd rtl_433/								
pi@f4goh:~/rtl_433 \$ mkdir build								
pi@f4goh:~/rtl 433 \$ cd build/								
pi@f4goh:~/rtl_433/build \$ cmake/								
The C compiler identification is GNU 8.3.0								
Check for working C compiler: /usr/bin/cc								
Check for working C compiler: /usr/bin/cc works								

make

pi	@f4g	oh:~/rtl_433/bu	uild	\$ make
Sc	anni	ng dependencies	of	target r_433
[1%]	Building C obj	ect	<pre>src/CMakeFiles/r_433.dir/abuf.c.o</pre>
[1%]	Building C obj	ect	<pre>src/CMakeFiles/r_433.dir/am_analyze.c.o</pre>
Γ	2%]	Building C obj	ect	<pre>src/CMakeFiles/r_433.dir/baseband.c.o</pre>
Γ	2%]	Building C obj	ect	<pre>src/CMakeFiles/r_433.dir/bitbuffer.c.o</pre>
Г	3%1	Building C obj	ect	<pre>src/CMakeFiles/r 433.dir/compat paths.c.o</pre>

sudo make install

pi@f4goh:~/rtl_433/build \$ sudo make install
[88%] Built target r_433
[89%] Built target rtl_433
[92%] Built target data
[93%] Built target style-check
[94%] Built target baseband-test
[95%] Built target test_bitbuffer
[96%] Built target data-test
<pre>[97%] Built target test_fileformat</pre>
<pre>[98%] Built target test_optparse</pre>
[100%] Built target test_util
Install the project

Connect a VHF/UHF antenna to the rtl-sdr key and run the program. (beware underscore key)

rtl 433

Here are some weather stations in my neighborhood.

pi@f4goh:~	/rtl 433/buil	d \$ rtl 43	33					
rtl 433 version 20.02-56-gd4ce64b branch master at 202005201829 inputs file rtl tcp RTL-SDR								
Jse -h for usage help and see https://triq.org/ for documentation.								
Trying con	rying conf file at "rtl_433.conf"							
Trying con	rying conf file at "/home/pi/.config/rtl 433/rtl 433.conf"							
Trying con	rying conf file at "/usr/local/etc/rtl 433/rtl 433.conf"							
Trying con	Trying conf file at "/etc/rtl 433/rtl 433.conf"							
Registered	1 124 out of 1	52 device	decoding protoco	ls [1-4 8 11-12 15-17 19-21 23 25-26 1	29-36 38			
-60 63 67-	71 73-100 102	-105 108-1	116 119 121 124-1	28 130-149 151-152]				
Found Rafa	el Micro R820	T tuner						
Exact samp	le rate is: 2	50000.0004	414 Hz					
[R82XX] PL	L not locked!							
Sample rat	e set to 2500	00 S/s.						
Tuner gain	set to Auto.							
Tuned to 4	33.920MHz.							
time	: 2020-05-22	21:48:13						
model	: Nexus-T	House Co	ode: 162					
Channel	: 1	Battery	: 0	Temperature: 21.10 C				
time	: 2020-05-22	21:48:17		brand : OS				
model	: Oregon-THGR	122N		House Code: 26				
Channel	: 1	Battery	: 1	Temperature: 22.00 C				
Humidity	: 35 %							
time	: 2020-05-22	21:48:17		brand : OS				
model	: Oregon-THGR	122N		House Code: 26				
Channel	: 1	Battery	: 1	Temperature: 22.00 C				
Humidity	: 35 %							
^CSignal c	aught, exitin	g!	ctrl+c po	ur sortir				
pi@f4goh:~	/rtl 433/buil	d Ş	cuite po					

Next part: Installation and configuration of a sdr listening server (openwebrx)

Next: https://github.com/projecthorus/radiosonde_auto_rx/wiki





Prerequisite: Discovery of Raspberry PI Part 4



Summary:

Part 6: OpenwebRX.

6.1 Introduction	P. 2
6.2 Installation of the ready-to-use image	P. 3
6.3 Creating a user and minimum requirements	P. 5
6.4 Spots Reporting on pskreporter or in WSPR	P. 9
6.5 Openwebrx access out of the QRA	P. 11

This tutorial only comments on the <u>openWebRX</u> instructions.

Version du 22/05/2021 V3

6.1 Introduction.

The objective of this tutorial is to install in his radio shack, the openwebRX software in order to create his own SDR web.

When you are on the move, you just have to connect to your laptop at home to listen to the desired frequency band using your own antennas.



OpenwebRX is a solution for remote spectrum monitoring and has AM / FM / SSB / CW / BPSK31 demodulators. It uses a lightweight signal processing (DSP) library called libcsdr. The spectrum display is like any waterfall radio software; however, the display can also be viewed in 3D.



Since the upload speed of a private Internet connection is relatively low, care should be taken to ensure that there are not too many people connected to the same server.

OpenWeb RX (f))	a, france Loc: JN07dv, ASL: 80 m Status Log Receiver Map Settings
BPSK3 FT4 ([[]58	
7.05 MHz 7.10 MHz	7.15 MHz 7.20 MHz 7.25 MHz 7.30 MHz
	7,0742 MHz
	7,1929 MHz
	RTL-SDR USB Stick 40m
i ya madalafi wani dhu kena bidu aa shiku aasa	FM WFM AM LSB USB
UTC dB DT Freq Message	Clear CW DMR D-Star NXDN
131930 -3 1.3 7075052 CO HB9DRY IN36	
131930 -8 0.2 7076200 CQ DL4FBZ 041	YSF M17 FreeDV DRM
131930 -14 0.2 7074986 OZ1BM DH1OL 73	DIG FT8 👻
131930 -16 0.4 7074542 PA1HGM S51TA R-17	
131930 0 -0.5 7075626 MW7FRN DK6CS J <u>031</u>	
131930 -2 -0.1 7075627 MW7FRN PA5PEK J <u>011</u>	
131930 -15 0.1 7075348 CQ PE1DDA JO22	
Audio buffer [0.4 s] Audio output [47.8 ksps]	
Network usage [282.5 kbps] Server CPU [38%]	Clients [1]

6.2 Installation of the ready-to-use image

The project initially created by Andras, HA7ILM was taken over by Jakob DD5JFK. Jakob had the good idea to propose a ready to use Raspberry Pi image.



Start by downloading the zip file 2020-11-30-OpenWebRX-full.zip or later.

OpenWebRX Raspberry Pi SD card images

File name

Last modified

2021-05-09-OpenWebRX-full.zip

09.05.2021, 18:37

Unzip the file, then use https://www.balena.io/etcher to copy the image to an mSD card.

25% Extraction E:\wsprClub	b\tuto-r OpenWebR)	(-full.zip		Etcher	×
Temps écoulé : Temps restant : Fichiers:	00:00:07 00:00:20 0	Taille totale : Vitesse : Traité :	2488 M 88 MB/s 629 M 134 M		¢
Extraction 2020-11-30-OpenWebRX-full.im	21% g	compresse.	m 1 .	Select image Select drive Flash	
				Img. iso, zip, and many more	
	Arrière-plan	Pause	Annuler	🌍 balena Etcher is an open source project by 🌍 balena 🤃 14 s	

Use tutorial 4 to configure the keyboard in your language and enable the ssh connection more convenient to configure openwebrx with the **Putty** utility.

Attention the keyboard configuration is initially in qwerty. Then run the raspi-config and follow the tutorial 4.

Once the board is inserted into the Raspberry PI and powered up **with the rtl-sdr dongle plugged in**, perform a connectivity test between a fixed PC and the RPI using the Windows console.



ping openwebrx

Invite de commandes	C:\Users\anthony>ping openwebrx			
	Envoi d'une requête 'ping' sur openwebrx.home [192.168.1.24]			
	Réponse de 192.168.1.24 : octets=32 temps=1 ms ITL=64			
	Réponse de 192.168.1.24 : octets=32 temps<1ms TTL=64 Réponse de 192.168.1.24 : octets=32 temps<1ms TTL=64			
	Réponse de 192.168.1.24 : octets=32 temps<1ms TTL=64			
	Statistiques Ping pour 192.168.1.24: Paquets : envoyés = 4, reçus = 4, perdus = 0 (perte 0%), Durée approximative des boucles en millisecondes : Minimum = Oms, Maximum = 1ms, Moyenne = Oms			
	C:\Users\anthony>_			

With Putty, establish an **SSh** connection with the Raspberry. Please note that the **SSh** connection must be enabled as explained in **tutorial 4**.

Reputity Configuration	? **	P pi@openwebrx: ~
Category: - Session - Logging - Terminal - Keyboard - Bell - Features - Window - Appearance - Behaviour - Translation - Selection - Colours - Connection - Data - Proxy - Teinet - Riogin - SSH - Serial - Mout - Logen - Minore - Selection - Se	Basic options for your PuTTY session Specify the destination you want to connect to Host Name (or IP address) Port openwebrx 22 Connection type: Rag Rag Telnet Rlogin Load, save or delete a stored session Saved Sessions openwebrx Image: Connection type: Load Default Settings Image: Connection type: Load Close window on expt: Image: Connection type: Connection type: Always Never Image: Connection type: Image: Connection type:	<pre>login as: pi pi@openwebrx's password: raspberry Linux openwebrx 5.10.17-v71+ #1414 SMP Fri Apr 30 13:20:47 BST 2021 armv71 The programs included with the Debian GNU/Linux system are free software; the exact distribution terms for each program are described in the individual files in /usr/share/doc/*/copyright. Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent permitted by applicable law. Last login: Sat May 22 12:51:59 2021 SSH is enabled and the default password for the 'pi' user has not been chan This is a security risk - please login as the 'pi' user and type 'passwd' t a new password. pi@openwebrx:~ \$</pre>

6.3 Creating a user and minimum requirements

With Putty, create a user as explained in the guide here https://github.com/iketterl/openwebrx/wiki/User-Management

A minimum of 2 commands must be entered to create a user. Replace the username with your callsign. (I used a simple password for the tests: toto)

sudo openwebrx admin adduser f4goh sudo openwebrx admin enableuser f4goh sudo openwebrx admin listusers	<pre>pi@openwebrx:~ \$ sudo openwebrx admin listusers List of enabled users: pi@openwebrx:~ \$ sudo openwebrx admin adduser f4goh Please enter the new password for f4goh: Please confirm the new password: Creating user f4goh pi@openwebrx:~ \$ sudo openwebrx admin enableuser f4goh pi@openwebrx:~ \$ sudo openwebrx admin listusers List of enabled users:</pre>	
	pigopenwebrx:~ \$ sudo openwebrx admin fistusers List of enabled users: f4goh pigopenwebrx:~ \$	

In the URL bar of firefox enter the following address https://openwebrx/ or openwebrx :8073



Add security exception





Username	Settings		
f4goh Password	General settings	SDR devices and profiles	Bookmark editor
	Demodulation and decoding	Background decoding	Spotting and reporting
	Feature report		

Configuration minimale de la station réceptrice

Fill in the data fields	General Settings Receiver information			
- Code ;				
- Location ;	Receiver name	f4goh		
- Altitude ;	Receiver location	Téloché, france		
- Geographical position ;	Receiver elevation	80 🚔 meters above mean sea level		
It is possible to change the background image	Receiver admin	f4goh@orange.fr		
and the icon.	Receiver coordinates	47,89 20,27		
Finish by applying and saving the changes.		For development purposes only Lover development purposes only Honores on the second se		
	Photo title	Sounding balloon		

Receiver band additions (SDR devices and profiles menu)



The rtl-sdr key is well detected. There are two default profiles, one in UHF and one in VHF. Click on the link RTL-SDR USB Stick
Addition of a new HF reception profile on 40m.

RTL-SDR USB Stic	k 70cm Repea	aters 2m	New profile	
Profile set	ttings			
Profile name	40m			
Center frequency	7.1		M	Hz 🔻
Sample rate	0,00002048		MS	6/s ▼
Initial frequency	7.1		M N	Hz 🔻
Initial modulation	LSB			•
Additional optional settings	Direct Sampling			Add

Add Direct Sampling mode

RTL-SDR USB Stick	70cm Repeaters	2m	40m	New profile					
Profile settings									
Profile name	40m								
Center frequency	7,1				🔶 MHz 🔻				
Sample rate	2,048				➡ MS/s				
Initial frequency	7,1				🔶 MHz 🔻				
Initial modulation	LSB				•				
Direct Sampling	Direct Sampling (Q branch	h)			- Remove				
Additional optional settings	Device gain				▼ Add				
Settings / SDR device setti	ngs / RTL-SDR USB Stick	: / 40m							
				Remove profile	Apply and save				

Select the Q branch option for HF, then save the configuration.

In the URL bar of firefox enter the following address https://openwebrx/ or openwebrx :8073



https://openwebrx/

Select the previously created profile 40 from the strip menu.

O



It is possible to decode in real time different digital modes such as FT8 and to have the mapping of the locators.



6.4 Spots Reporting on pskreporter or in WSPR

In the **Spotting and reporting menu**, it is possible to activate the reporting of stations in APRS, PSK and WSPR.



Don't forget to activate background decoding (Background decoding menu)

Ba Backgrou	ackground decoding
	Enable background decoding services
Enabled services	
	☐ F14 ☐ [T65
	V WSPR
	FST4
	FST4W
	🔲 JS8Call
	Packet
Settings / Backgro	ound decoding
	Apply and save

15 minutes later the reports were completed in FT8 and WSPR.



Think about adding an HF filter at the input, it improves listening.



It is possible to register on the following site <u>https://www.receiverbook.de</u> in order to declare your webradio or to listen to a station. If you want to make your webradio public, If you want to make your web radio public, you will need to get a software key and change the configuration in general settings.

The openwebRX software is much more powerful with a RaspberryPI 4. The new version of openwebRX from DD5JFK is exceptional and very well done. Unfortunately, the documentation provided by Jacob is not as good and lacks a lot of explanations.

6.5 Openwebrx access out of the QRA

To access the Raspberry Pi from outside your QRA, you need to set up the ADSL box or the fiber so that it directs the connection request to the Raspberry PI on the local network. Not having at my disposal all the boxes of the different Internet service providers, I will only detail the configuration of the Orange LiveBox. For the other providers, it will be necessary to do an Internet research on port forwarding and domain name configuration.

The configuration is done in 2 steps:

- Perform a port forwarding (8073) to the Raspberry PI with the IP address 192.168.1.145 for my case.

 Get a free domain name so that I don't remember by hear 	rt the IP address provided by the service
provider.	

Check the name assigned to the Raspberry PI (here F4GOH)

Vertice 272.6	··· ··· ··· ··· ··· ··· ··· ···
Paramétrer l'équipen	nent
Type d'équipement	Ordinateur
nom	f4goh
Adresse IP	192.168.1.145
Adresse MAC	DC:A6:32:7F:CC:A2
Connexion Internet	connecté

F4GOH – KF4GOH

In the advanced settings, network menu, then DHCP, add your Raspberry Pi as static IP address.

Paramètres avancés	Retour Résea	au		
	DHCP NAT/PAT E	DNS UPnP DynDNS DMZ	NTP IPv6	
Reseau	Baux DHCP statiqu	es adresse IP à votre équipement.		
	f4goh	▼ 192.168.1.145	DC:A6:32:7F:CC:A2	Ajouter
	Équipement	Adresse IP statique	Adresse MAC	
	Équipement	100.400		Ê
	Équipement	102-100-1		Ê
	f4goh	192.168.1.145	DC:A6:32:7F:CC:A2	â

In the advanced settings, network menu, then NAT/PAT, add a new port forwarding to the Raspberry PI on port 8073.

NAT/PAT DNS UPnP DynDNS DMZ NTP IPv6	DHCP NAT/PAT DNS UPnP
--------------------------------------	-----------------------

Les règles NAT/PAT sont nécessaires pour autoriser une communication initiée depuis Internet avec un équipement particulier de votre réseau. Utiles pour certaines applications comme des jeux en lignes ou des serveurs de type FTP ... Assurez-vous que cet équipement a une adresse IP statique (paramètrable dans l'onglet DHCP).

Uniquement pour des équipements IPv4.

r in ser	ver 🔻 21	21	TCP	 raspberr 	ypi-1 🔻 Crée
FTP Ser	ver) ex. : 10	00-2000		
FTP Data	a				
Telnet		Port interne	Port externe	Protocole	Équipement
Secure S	Shell Server (SSH)				
Secure \	Neb Server (HTTPS)				
nouveau					
Retour	Réseau				
DIG	NAM AT DNS				
14/	DY 0070	0070	TOD	54 m l	Cutan
openWel	bRX 8073	8073	ТСР	▼ f4goh	✓ Créer
openWel	6RX 8073	8073	-2000	▼ f4goh	✓ Créer
openWel	bRX 8073	8073	-2000	▼ f4goh	✓ Créer
openWel	Application/Service	8073 2000 ex. , 7000 Port interne	Port externe	▼ f4goh Protocole	Créer
openWel	Application/Service Web Server (HTTP)	Port interne	Port externe	▼ f4goh Protocole TCP	Équipement
openWel	Application/Service Web Server (HTTP) radio	Port interne	Port externe	▼ f4goh Protocole TCP TCP	Créer

Still in the advanced settings, network menu, then DynDNS, consult the list of providers available for your BOX. I chose to take noip

Retour	Ré	seau									
DHCP	NAT/PAT	DNS	UPnP	DynDNS	DMZ	NTP	IPv6				
Le servic statique d	e DynDNS ou dynamic	permet d'att jue ou à une	ribuer un noi Iongue URL	m de doma	iine et d'h	ôte fixe, f	acile à mém	oriser, à ur	ne adresse	; IP	-
Utile, par facilemer	exemple, s nt (nom de	si vous héber type monser	gez un site v veur.dydns.c	web ou un s org).	serveur F	TP derriè	ère votre Live	box pour le	e retrouver		
No-IP	-	Nom d'hôt	e/de domain	le Nom	d'utilisate	eur email	Mot de	passe	En	registrer	
dyndns											
No-IP											
Change	ЯР	m d'hôte/de	domaine	Email	utilisate	ur l	Not de pass	e Mi	se à jour		
DNSdyr	namic										
Register o	n the http	<u>os://www.n</u>	<u>oip.com/</u> w	vebsite by	/ selectir	ng a dor	main name	. Remen	nber the		
password	for future	use.									
	C 🕜	🖸 🔒 http	os://www.noi	p.com	••	· 🛛 🖒	Reck	hercher] <mark>↓</mark> III	\	III
Cr	eate an	easy to re	member	hostnam	ie and i	never lo	ose your o	onnecti	on agai	n.	

	The second se	(DA	
c	reate Your Free Hostname Now		
f4goh	.ddns.net 🗸	Sign Up	





You will have to do this every month or pay a subscription.

Back in the advanced settings, network menu, then DynDNS, enter the domain name previously chosen with the email account used for registration and its password.

	Réseau							
DHCP	NAT/PAT DNS	UPnP Dyr	DNS DMZ	NTP	IPv6			
Le service E statique ou d Utile, par ex facilement (DynDNS permet d'attri dynamique ou à une lo emple, si vous héberg nom de type monserv	ibuer un nom d ongue URL. gez un site web /eur.dydns.org)	e domaine et d'hôl ou un serveur FT	e fixe, faci P derrière	le à mémor votre Livebo	iser, à une ox pour le	e adresse II retrouver	Ρ
No-IP	▼ f4gohsdr.do	dns.net	f4goh@orange.t	r	•••••	•••	Enre	gistrer
Service No-IP	Nom d'hôte/de o	domaine s.net	Email utilisateu f4goh@orange.f	r Mo r	t de passe	Mis Non d	e à jour disponible	<u>∎</u> ←
now possib	la ta connact ta	openWebF	RX with the fo	llowing	address	from o	utside th	ne QRA:
) → C' 6		<pre></pre>	hsdr.ddns.net:8073					
)) → ୯ ۲)	Neb RX		hsdr.ddns.net:8073	H HE, Fran	ce Loc:]	JN07dv,	ASL: 200	m, [<u>maps</u>]

lt



Summary:

Part 7: r2could and radiosonde auto rx



Prerequisites: Discovery of Raspberry Pi part 1

7.1 R2could introduction	P. 2
7.2 R2Could Installation	P. 3
7.3 Start r2could	P. 6
7.4 Troubleshooting	P. 10
Prerequisite: Raspberry PI Tutorial Part 4 and 5	
7.5 Radiosonde auto rx introduction	P. 11
7.6 Radiosonde auto rx Installation	P. 11
7.7 Start radiosonde auto rx	P. 16

This tutorial only comments on the user manual or the existing wiki with additional screenshots.

Version 5/09/2020 V1.0

7.1 R2could introduction.

The NOAA (National Oceanic and Atmospheric Administration) satellites have been in orbit for a long time. They emit continuous weather images on 137Mhz. Currently there are 3 (NOAA15,18 and 19), they have been joined by a Russian satellite Meteor-M2 which broadcasts color images.

The advantage of using a Raspberry Pi to receive weather images is obvious, we have no regrets about leaving it on 24 hours a day. Its software automatically updates the orbital parameters of the satellites (TLE: "Two-Line Elements") and manages the reception and decoding of the images.

Moreover, r2could also decodes the telemetry of cubesats. As soon as a new cubesat is in service, the update is automatic.

For aerials, the use of a dual-band antenna is enough to start. But if you want to get the best possible reception, a 137 Mhz four-wire QFH antenna is easy to build.



On the hardware side, a Raspebrry Pi and an rtl-sdr key are sufficient. No monitor or keyboard connected to the Raspberry PI is required, even for commissioning.





F4GOH – KF4GOH 7.2 R2Could Installation

https://github.com/dernasherbrezon/r2cloud

From the link above, download the file image_2020-03-21-r2cloud-lite.zip and choose the easy installation mode.

Installation

- 1. Install r2cloud
- · From the image. This is simpliest way and require brand new SD card
 - Download the latest official image
 - Insert SD card into the card reader and flash it. You could use Etcher to do this
 - Insert SD card into the card reader and create file r2cloud.txt in the root directory. This file should contain any random string. This string is a login token. This token will be used during initial setup.

Extraire le fichier compressé

20/05/2020 40 42	<u> </u>
extraire les fic	hiers
io)	
ers image_202	\image_2020
(Annuler
	extraire les fic

Download and install the utility and check to copy the image to an mSD card.

https://www.balena.io/etcher/

Flash OS images	to SD cards & USB drives	, safely and easily.
+ Select image		
Dov	vnload for Windows (x86 x64)	•

Select the file image_2020-03-21-r2cloud-lite.img, the reader of the mSD card, then click on Flash.

Etcher Image_2020-03-21-r2cloud-life.img 2020-03-2lite.img Generic MSB Device 1.99 G8 Change Change 15.49 G8	• • • • • • • • • • • • • • • • • • •
Solena Etcher is an open source projection of the source projection of	et by 📦 balena 1.4.9
 Flash Complete! 1 Successful device 	Flash Another
Once the copy is complete, unplug and plug the mSd card reader.	Exécution automatique boot (G:)
In Windows, the window below will appear.	Options : générales Ouvrir le dossier et afficher les fichiers

In the explorer, make sure that you can see the file extensions by following steps 1 to 5 (box 4 unchecked).

Options d'exécution automatique dans le Panneau de configura

a a service and a service	
◯ ⊂ → Ordinateur → boot (G:) →	Options des dossiers 3
Organiser Partager avec Graver Nouveau dossier Couper Nom issue.txt Copier Coller issue.txt Coller Annuler config.txt Rétablir fixup4.dat fixup4.dat Sélectionner tout fixup4.dat start_cd.elf Disposition start_cd.elf Supprimer 2 start_x.elf Supprimer les propriétés start4.elf start4.elf Propriétés start4.elf start4.elf Start4.elf start4.elf start4.elf	Général Affichage Rechercher Affichage des dossiers Vous pouvez appliquer le type d'affichage (les détails ou les icônes, par exemple) de ce dossier à tous les dossiers du même type. Appliquer aux dossiers Réinitialiser les dossiers Paramètres avancés : Réinitialiser les dossiers Image: Afficher les fichiers, dossiers et lecteurs cachés Ne pas afficher les fichiers, dossiers ou lecteurs cachés Image: Lors de la saisie en mode d'affichage Liste Effectuer la saisie automatiquement dans la zone Rechercher Image: Scilectionner l'élément affiché correspondant au texte saisi Masquer les ichiers protégés du système d'exploitation (recommandé) Image: Les fichiers des dossiers dans un processus différent Restaurer les fichiers des dossiers ouvertes lors de la prochaine ouverture de se miniatures Image: Image
38 élément(s)	5 OK Annuler Appliquer

Create a new file named r2could.txt

Documents		Nom	Modifié le	Type	Taille		2 .		
Images		In the second se	wouldere	Type	rune	<u> </u>			
J Musique		issue.txt	21/03/2020 12:06	Document texte	1 Ko	Cli	que droit 🔰 🚺 🍳 🗄	Recherc	Dossier
Vidéos		cmdline.txt	21/03/2020 12:06	Document texte	1 Ko	da	ns la zone blanche		Raccourci
_		config.txt	21/03/2020 11:56	Document texte	2 Ko		=		Microsoft Access Database
Ordinateur		fixup4.dat	12/02/2020 12:33	Fichier DAT	/ Ko		1		Image bitmap
🍒 Disque local (C:)		fixup4cd.dat	12/02/2020 12:33	Fichier DAT	4 Ko	- 2 4 -	AMD Catalyst Control Center		Contact
🖉 Lecteur DVD RW (D:) DSII_1		fixup4x.dat	12/02/2020 12:33	Fichier DAT	9 Ko		Affichage	• • I	Document Microsoft Word
📷 temp (E:)		start.elf	12/02/2020 12:33	Fichier ELF	2 816 Ko		Trier par	•	Document Journal
🚘 sauve (F:)		start_co.eif	12/02/2020 12:33	Fichier ELF	075 KO		Regrouper par		Microsoft Access Database
🕳 boot (G:)		start_db.en	12/02/2020 12:33	Fichier ELF	4 747 KO		Actualiser		Dessin OpenDocument
🎍 overlays	E		12/02/2020 12:55	Fichier ELF	3 709 KO		, letouise		Présentation OpenDocument
		start4.elf	12/02/2020 12:33	Fichier ELE	2 720 Ko		Personnaliser ce dossier		Classeur OpenDocument
Réseau		start4db.elf	12/02/2020 12:33	Fichier ELF	4 486 Ko		Coller		Texte OpenDocument
MANTHONY-PC		start4v elf	12/02/2020 12:33	Fichier ELE	3 464 Ko	-	Git GUI Here		Présentation Microsoft PowerPoint
LIVEBOX		fixun4dh dat	12/02/2020 12:30	Fichier DAT	9 Ko		Git Bash Here		Microsoft Publisher Document
		fixup-dat	05/02/2020 14:25	Fichier DAT	7 Ko		Coller le raccourci		Fichier Python
	Ψ.					_	Annuler la suppression	trl+Z	Eormat RTE
38 élément(s)									Document texte
-						*	Envoyer par transfert		Equille de calcul Microsoft Excel
							Partager avec	→ [Dossier compressé
							Nouveau 3	•	Porte-documents
							Propriétés		

Open the **r2could.txt** file and indicate his login. To make it simple, use his callsign. Don't forget to save the file.

🙆 kernel.img	03/02/	2020 11-50	Fick	nier d'ima	ne di	5.023 Ko
🙆 kernel7.img	03/02,	r2clos	ud.txt - Bl	oc-notes		
🙆 kernel7l.img	03/02,	Fichier	Edition	Format	Affichage	?
🙆 kernel8.img	03/02,	kb1goh	1			
bootcode.bin	17/01,					
LICENCE.broa	17/01,					
COPYING.linux	24/06,					
퉬 overlays	21/03,					
r2cloud.txt	29/05/					

Insert the mSd card into the Raspebrry Pi, then turn on the power with the rtl-sdr key connected:



7.3 Start r2could

Use the domain name already preconfigured in the Raspberry PI https://raspberrypi.local, or use the IP address of its Raspberry PI connected on the local network.

Reminder: To know the IP address of the Raspberry Pi, please refer to the tutorial Part 1.

When connecting, accept the security exception.



Enter the previously chosen login in the text file. Also enter an email and a password.	Enter its longitude and latitude coordinates. (Coordinates in decimal degrees)	Accept automatic updates.
 https://192.168.1.145/#/setup Setup This is a first time login. Please setup account: Insert your SD card into the card reader Open SD card contents and create the file r2cloud.txt there Put some keyword into this file on a single line Save the file and open this page once again Enter the keyword, new email and password kb1goh kb1goh@yahoo.com 	Setup coordinates Base station coordinates are essential for scheduling satellite observations 47.890242 0.276770 Automatically detect using current browser. Detect Next	Automatic updates Automatic updates will keep your base station up-to-date. We constantly deliver new functionality and bug fixes Back Finish

The main page must appear

r2cloud	🕽 Observations 🛗 Schedule	♥ TLE 🔥 API	Status ▼ Configuration ▼ Logout
	DVB-T+DAB+FM	RTL-SDR	r2cloud
			*

In the Configuration menu, General, check the accuracy of the geographic coordinates of the receiving site.

2cloud 📦 Observations 📾 Sch	edule 🛛 TLE 🔥 API		Configuration - Logout
General confi	guration		General DDNS
Latitude	Longitude		DOCUMENT
47.890242	0.27677	Detect	K2 Server
PPM type	PPM		
AUTO	•		
Auto-update enabled			
Save			

In the TLE menu, the update is not done yet. You will have to wait several hours.

Le TLE n'est pas à jour	Le TLE est a jour (en vert)
r2cloud 🔎 Observations 🛗 Schedule 🛛 TLE 🔥 API	r2cloud 🛯 🛍 Observations 📾 Schedule 🔽 TLE 🔥 API
Last update: 21-03-2020 UTC	Last update: 28-05-2020 UTC
Satellite	Satellite



In the Schedule menu, select the satellites to be received.

r2cloud 🕅 Observation:	s 🛗 Schedule 🗣 TLE 🔥 API		Status ▼ Configuration ▼ Logou
Name	Next pass	Frequency	Enabled
NOAA 15	29-May-2020 18:36	137620000 hz	
NOAA 18	29-May-2020 19:45	137912500 hz	
NOAA 19	29-May-2020 16:24	137100000 hz	
GOMX-1		437250000 hz	
FUNCUBE-1 (AO-73)		145935000 hz	
METEOR-M 2	29-May-2020 17:54	137100000 hz	
AAUSAT 4		437424000 hz	

Leave the Raspberry Pi on and wait 24 to 48 hours.	0 https://192.168.1.145/#/login 90% •
To see the images, you will have to log in.	
	Login
	kb1goh@yahoo.com
	•••••
	Sign in
	Forgot password

In the Observations menu, click on the date of the concerned satellite (if data have been received, the line appears in green color).

∢→	C 🙆 🛛 🖟 https://192.168.1.75/#/admin/c	80 % ··· 🛛 🏠 🔍 Recherche	er 🕹 🔟 🗈 📚
r2cloud	🛍 Observations 🛗 Schedule 🛛 TLE 🔥 API		Status - Configuration - Logout
	Name	Date	Has data
	NOAA 18	<u>09:55 29-May-2020</u>	~
	NOAA 15	08:52 29-May-2020	~
	METEOR-M 2	08:06 29-May-2020	~

The received image will then appear.



The color images of the meteor satellite are distorted on the sides. This is normal, but the <u>SmoothMeteor</u> program can straighten these images.



RPI part 7-V1.0.docx

7.4 Troubleshooting

If after 48 hours no image is received, the antenna and the connectivity between the rtl-sdr key and the Raspberry Pi must be checked.

The ssh connection with the Putty utility and the Raspberry PI is not possible. It will be necessary to connect a monitor and a keyboard on the Raspberry Pi.

Raspberrypi login : **pi** Password : **raspberry**

Check rtl_sdr key :

rtl test

```
i@raspberrypi:
                   rtl test
Found 1 device(s):
 0: Realtek, RTL2838UHIDIR, SN: 00000001
Using device 0: Generic RTL2832U OEM
Found Rafael Micro R820T tuner
Supported gain values (29): 0.0 0.9 1.4 2.7 3.7 7.7 8.7 12.5 14.4 15.7 16.6 19.
20.7 22.9 25.4 28.0 29.7 32.8 33.8 36.4 37.2 38.6 40.2 42.1 43.4 43.9 44.5 48.0
49.6
[R82XX] PLL not locked!
Sampling at 2048000 S/s.
Info: This tool will continuously read from the device, and report if
samples get lost. If you observe no further output, everything is fine.
Reading samples in async mode...
CSignal caught, exiting!
                            CILITE
User cancel, exiting...
Samples per million lost (minimum): 0
oi@raspberrypi:~ $ ^C
```



7.5 Radiosonde auto rx introduction

Like r2could for satellites, the radiosonde auto rx software allows to receive and display on a map the position of weather radiosondes sent regularly.

https://github.com/projecthorus/radiosonde_auto_rx/wiki

Currently, the models of radiosondes supported by the software are as follows:

- Vaisala RS92 (experimental support for the RS92-NGP)
- Vaisala RS41
- Graw DFM06/DFM09/DFM17/PS-15
- Meteomodem M10
- Intermet iMet-4 (and 'narrowband' iMet-1 sondes)
- Lockheed Martin LMS6, 400 MHz and 1680 MHz variants (including the new 'LMS-X' type)
- Meisei iMS-100

7.6 Radiosonde auto rx Installation

There is no ready-to-use image file. To install the radiosonde auto rx software, you will need to prepare an mSD card with "Raspbian Lite" and install the rtl-sdr libraries.

Preliminary Installation Summary:

- HAM Radio with the Raspberry Pi Part 4 (Complete installation except the backup of the mSd card which can be done later);

- HAM Radio with Raspberry Pi Part 5.6 Installation of the RTL-SDR key as summarized in the following commands:

Updating repositories and software: (it is recommended to use the PuTTY utility)

sudo apt update sudo apt upgrade

Installing the git utility:

sudo apt install git

Installation of dependencies for radiosonde auto rx

```
sudo apt-get install python-numpy python-setuptools python-crcmod python-
requests python-dateutil python-pip sox git build-essential cmake usbutils
libusb-1.0-0-dev rng-tools libsamplerate-dev
```

```
pi@f4goh:~ $ sudo apt-get install python-numpy python-setuptools python-crcmod p
ython-requests python-dateutil python-pip sox git build-essential cmake usbutils
libusb-1.0-0-dev rng-tools libsamplerate-dev
```

Installation of libraries for python programming software

sudo pip install flask flask-socketio

pi@f4goh:~ \$ sudo pip install flask flask-socketio	
Looking in indexes: https://pypi.org/simple, https://www.piwheels.org/simple	
Collecting flask	
Downloading https://files.pythonhosted.org/packages/f2/28/2a03252dfb9ebf377f	40
fba6a7841b47083260bf8bd8e737b0c6952df83f/Flask-1.1.2-py2.py3-none-any.whl (94k	B)
100% 102kB 141kB/s	
Collecting flask-socketio	
Developeding https://files.muthenhosted.eng/packages/f0/01/2000f27as00s002000	0 -

You will find the installation of the rtl-sdr radio receiver key as in part 5.6 of the tutorial.



pi@raspberrypi:~/rtl-sdr/build \$ sudo nano /etc/modprobe.d/rtlsdr-blacklist.conf

sudo nano /etc/modprobe.d/rtlsdr-blacklist.conf

```
blacklist dvb_usb_rtl28xxu
blacklist rtl2832
blacklist rtl2830
blacklist dvb_usb_rtl2832u
blacklist dvb_usb_v2
blacklist dvb_core
```

Copy and paste the above list into the nano editor. Right click reminder: to paste the text in the nano editor.





Restart the Raspberry PI: pigraspberrypi sudo reboot

sudo reboot

Verification: Plug the rtl-sdr key into a USB port on the Raspberry Pi. Connect the rtl-sdr key to the Raspberry Pi on a free USB port.



Check the presence of the rtl-sdr key:

With LXTerminal or Putty, type the following command line:

lsusb



Find rtl-sdr key : RTL238 DVB-T

Raspberry Pi 3 :

pi@raspberrypi:~ \$ lsusb									
Bus	001	Device	004:	ID	0bda:2838	Realtek Semiconductor Corp. RTL2838 DVB-T			
Bus	001	Device	003:	ID	0424:ec00	Standard Microsystems Corp. SMSC9512/9514 Fast			
Ethe	Ethernet Adapter								
Bus	001	Device	002:	ID	0424:9514	Standard Microsystems Corp. SMC9514 Hub			
Bus	001	Device	001:	ID	1d6b:0002	Linux Foundation 2.0 root hub			

Raspberry Pi 4 :

```
pi@raspberrypi:~ $ lsusb
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 003: ID 0bda:2838 Realtek Semiconductor Corp. RTL2838 DVB-T
Bus 001 Device 002: ID 2109:3431 VIA Labs, Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

With LXTerminal or Putty, type the following command line: (be careful, underscore key)

```
rtl test
```

The rtl-sdr key should be recognized, if not, disconnect and reconnect the key and restart the test.

pi@raspberrypi:~ \$ rtl_test Found 1 device(s):
0: Realtek, RTL2838UHIDIR, SN: 00000001
Using device 0: Generic RTL2832U OEM
Found Rafael Micro R820T tuner
Supported gain values (29): 0.0 0.9 1.4 2.7 3.7 7.7 8.7 12.5 14.4 15.7 16.6 19.7
20.7 22.9 25.4 28.0 29.7 32.8 33.8 36.4 37.2 38.6 40.2 42.1 43.4 43.9 44.5 48.0
49.6
[R82XX] PLL not locked!
Sampling at 2048000 S/s.
Info: This tool will continuously read from the device, and report if
samples get lost. If you observe no further output, everything is fine.
Reading samples in async mode
^{^CSignal caught, exiting!} Ctrl+C
User cancel, exiting
Samples per million lost (minimum): 0
pi@raspberrypi:~ \$ ^C

Radiosonde Auto RX software Installation

git clone https://github.com/projecthorus/radiosonde auto rx.git

ls

pi@f4goh:~ \$ git clone https://github.com/projecthorus/radiosonde_auto_rx.git Clonage dans 'radiosonde_auto_rx'... remote: Enumerating objects: 37, done. remote: Counting objects: 100% (37/37), done. remote: Compressing objects: 100% (27/27), done. remote: Total 5202 (delta 17), reused 18 (delta 10), pack-reused 5165 Réception d'objets: 100% (5202/5202), 12.45 MiB | 1008.00 KiB/s, fait. Résolution des deltas: 100% (3551/3551), fait. pi@f4goh:~ \$ ls radiosonde_auto_rx rtl-sdr pi@f4goh:~ \$ Don't forget the tab key TAB. The reflex for typing the 2 command lines without copying and pasting in PuTTY must be: cd ra TAB a TAB ./b TAB



cd radiosonde auto rx/auto rx ./build.sh

pi@f4goh:~ \$ cd radiosonde_auto_rx/auto_rx/
<pre>pi@f4goh:~/radiosonde_auto_rx/auto_rx \$./build.sh</pre>
Building dft_detect
Building RS92/RS41/DFM/LMS6/iMS Demodulators
Building LMS6-1680 Demodulator.
Building iMet Demodulator.
Building fsk-demod utils from codec2
Copying files into auto_rx directory.
Done!
pi@f4goh:~/radiosonde auto rx/auto rx \$

Copy the configuration file

cp station.cfg.example station.cfg

Edit the configuration file station.cfg with the nano editor

pi@f4goh:~/radiosonde_auto_rx/auto_rx \$ nano station.cfg

https://github.com/projecthorus/radiosonde_auto_rx/wiki/Configuration-Settings

Below is the minimum configuration:

Modification	Avant	Après
*************************************	<pre>the sondes are min_freq = 400.05 max_freq = 403.0</pre>	<pre># the sondes are min_freq = 400.05 max_freq = 406.0</pre>
Define the geographical position of the listening station. Coordinates in decimal degrees.	<pre># Used by the Habitat [location] station_lat = 0.0 station_lon = 0.0 station_alt = 0.0</pre>	<pre># Used by the Habitat Upl [location] station_lat = 47.890242 station_lon = 0.276770 station_alt = 80.0</pre>
#####################################	<pre>habitat enabled = False # Uploader callsign, as shown above. uploader callsign = CHANGEME AUTO RX # Upload listener position to Habitat upload_listener_position = True # Uploader Antenna Description. # If upload_listener_position is enak uploader_antenna = 1/4 wave monopole *</pre>	<pre>habitat_enabled = True # Uploader callsign, as shown a uploader callsion = F4GOH # Upload listener position to H upload listener position = True # Uploader Antenna Description. # If upload_listener_position i uploader antenna = diamond x200</pre>

Run the program with python. (Make sure to run the program from the radiosonde_auto_rx/auto_rx directory)

python auto_rx.py

pi@f4goh:~/radiosonde_auto_rx/auto_rx \$ python auto_rx.py
2020-05-30 09:43:36,434 INFO:Reading configuration file
2020-05-30 09:43:39,303 INFO:Config - Tested SDR #0 OK
2020-05-30 09:43:39,309 INFO:Started Flask server on http://0.0.0.0:5000
* Serving Flask app "autorx.web" (lazy loading)
* Environment: production
2020-05-30 09:43:39,313 INFO:Telemetry Logger - Started Telemetry Logger Thread.
WARNING: This is a development server. Do not use it in a production deployment.
Use a production WSGI server instead.
* Debug mode: off
2020-05-30 09:43:39,315 INFO:OziMux - Started OziMux / Payload Summary Exporter
2020-05-30 09:43:39,755 INFO:Version - Local Version: 1.3.1 Current Master Version: 1.3.1
2020-05-30 09:43:39,756 INFO:SDR #0 has been allocated to Scanner.
2020-05-30 09:43:42,608 INFO:Scanner #0 - Starting Scanner Thread
2020-05-30 09:43:42,613 INFO:Scanner #0 - Running frequency scan.

Once the program radiosonde auto rx is executed, open with a browser the web page with the IP address of the Raspberry PI on port 5000.

http://192.168.1.145:5000/

or with your domain name http://f4goh:5000/



A map should appear with, if any, the position of the balloons.

With the browser, go to the following WEB page:



http://tracker.habhub.org/

Your station should be listed. This site also indicates the presence of probe balloons and the possibility for your station to decode them.

To exit the program, press ctrl+c

```
403.05 402.98 402.92]
                                                             ctrl+c
C2020-05-30 10:07:11,924 INFO:Web - Flask Server Shutdown.
2020-05-30 10:07:11,925 INFO:Starting shutdown of all threads.
2020-05-30 10:07:11,926 INFO:Scanner #0 - Waiting for current scan to finish...
2020-05-30 10:07:23,134 INFO:Scanner #0 -
                                          Scanner Thread Closed.
2020-05-30 10:07:23,402 INFO:Telemetry Logger - Stopped Telemetry Logger Thread.
pi@f4goh:~/radiosonde auto rx/auto rx
```

Automatically start "radiosonde auto rx" when starting the Raspberry PI

(From the radiosonde_auto_rx/auto_rx folder)

cd ~/radiosonde auto rx/auto rx/

Copy the startup file

sudo cp auto_rx.service /etc/systemd/system/

Restart the Raspberry PI

sudo reboot

Once the program radiosonde auto rx is executed, open with a browser the web page with the IP address of the Raspberry PI on port 5000.

http://192.168.1.145:5000/ or with your domain name http://f4goh:5000/

Radiosonde Auto-RX Status Version: 1.3.1

Current Task: SDR #0: Scanning



To remove "auto rx radiosonde" on startup of the Raspberry PI, perform the following command and then restart.

sudo rm /etc/systemd/system/auto_rx.service

To be continued:

Flight tracking of ADS-B aircraft: <u>https://flightaware.com/adsb/piaware/build</u>



Raspberry Pi for HAM Radio Part 8



Summary:

Part 8 : HamPi and RadioPI



–					
Prerequisites:	Discovery	of Ras	pberrv	y Pi	part 1

8.1 HamPi introduction	P. 2
8.2 Image disk installation	P. 3
8.3 Start HamPi	P. 5
8.4 RadioPi introduction	P. 9
8.5 Image disk installation	P. 10
8.6 Start RadioPi	P. 11
Appendix	P. 13
Version du 25/09/2021 V1.3	

F4GOH – KF4GOH 8.1 HamPi introduction

HamPi 1.x is a Raspbian distribution containing more than 100 preinstalled software created by Dave Slotter, W3DJS. The list of preinstalled software is in the appendix on page 9.

The organization of the menu containing the software is very well done.



8.2 Image disk installation



To make downloading easier, use <u>Free Download Manager</u> utility. This will resume the download in

	icon, paste the ORL of the file to download.
Free Download Manager	

_	_		-										
	+	▶		Ŵ	Ē							Q	≡.
	Voule	z-vous faire de	FDM votre	client tor	ent par défa	aut?				Définir par défaut	Ne pas rec	lemander	×
	Tout (3) Active (1)	Terminé	Torrent	YouTube	Vidéo	Musique	+					
		Nom				Statut			Vites	se	Taille	Ajout	é v
L		HamPi_v1	1.2a.img.xz			29%	33	m 55s	↓1,1 M	IB/s	1,02 / 3,47 GB	09:19	
					Géné	ral	Progressio	n	Conne	xions			\times
				HamPi	_v1.2a.ii	mg.xz							
		∞						29%	(41m 1	9s)			
		\bigcirc		Télécharg Vitesse d Ajouté le:	é : e télécharg	ement :	1,02 GB d 1,1 MB/s 09:19	le 3,47	GB				
				💼 C:/Use	ers/anthony	/Downlo	ads						
				http://han	npi.radiowa	ves.ca/H	lamPi_v1.2	a.imq.x	z				
)	↓0,98 MB/s	↑0 B/s	^							HamPi_	v1.2a.im	g.xz 💙

Download and install the utility and check to copy the image to an mSD card.

https://www.balena.io/etcher/



Select the file **HamPi vx.x.img.xz**, the player of the mSD card, then click on Flash.

Etcher – 6 - - - X Etcher 0 ¢ 0 ۵ HamPi_v....img.xz Generic... Device Select image 6% Flashing 0 Ouvrir → Ordinateur → temp (E:) ↓ tuto-rpi → W3DJS → HamPi_v1.0 → HamPi v1.0 by W3DJS Organiser 🔻 Nouveau dossier 🌍 balena Nom Modifié le Туре Favoris HamPi_v1.0.img.xz 18/06/2020 17:05 Fichier XZ 💻 Bureau 🔠 Emplacements récents

Please note that a 32GB mSD card is required.

It will take a good quarter of an hour for the writing and verification to be completed.



8.3 Start HamPi

As soon as the power is turned on, the country and language must be configured as explained in part 1.



By default the SSh and VNC connection is enabled.

The control of the Raspberry via PuTTY in SSh and the use of VNC viewer are explained in the 1st part of my tutorials.

Raspberry Pi Configuration 🛛 🗸 🔺 🗙								
System	Display	Interfaces	Interfaces Performance					
Camera:		Enable	Disable					
SSH:		• Enabl	le O [Disable				
VNC:		• Enabl	ible 🔿 Disable					
SPI:		🔿 Enabl	Disable					
I2C:		 Enable Di 		isable				
Serial Port:		🔿 Enabl	le 💿 [Disable				
Serial Console:		Enable	le O [Disable				
1-Wire:		🔿 Enabl	le 💿 [Disable				
Remote GPIO:		🔾 Enabl	le 💿 [Disable				
			Cancel	ОК				

I first plugged in the rtl-sdr key, but the rtl test command did not work. I had to do the manipulation explained in part 3 of my tutorials, page 6 with the command line terminal.

sudo nano /etc/modprobe.d/rtlsdr-blacklist.conf

pi@raspberrypi:~/rtl-sdr/build \$ sudo nano /etc/modprobe.d/rtlsdr-blacklist.conf

```
blacklist dvb usb rtl28xxu
blacklist rtl2832
blacklist rtl2830
blacklist dvb usb rtl2832u
blacklist dvb usb v2
blacklist dvb core
```

Copy and paste the above list into the nano editor

Reminder right click to paste the text in the nano editor



Ma

Ctrl

Alt

Save the file using the Ctrl + o keys, then Exit the editor using Ctrl + x. the enter key to validate the recording. 3 4. 5 2 ç Tab z e r t У u 0 Tab а u ້ \$ Verr. maj q d h k g Verr. maj a d g h

Ctrl

w

Alt

Maj



AltGr

0 р

AltGr

m

Ctrl

ù

pi@raspberrypi:~/rtl-sdr/build \$ sudo reboot

sudo reboot

Verification: Plug the rtl-sdr key into a USB port on the Raspberry Pi. With LXTerminal or Putty, type the following command line :

```
lsusb
```

Locate the rtl-sdr key : RTL238 DVB-T

Cas de la Raspberry Pi 4 :

```
pi@raspberrypi:~ $ lsusb
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 003: ID 0bda:2838 Realtek Semiconductor Corp. RTL2838 DVB-T
Bus 001 Device 002: ID 2109:3431 VIA Labs, Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

With LXTerminal or Putty, type the following command line : (be careful, underscore)

rtl_test

The rtl-sdr key should be recognized, if not, disconnect and reconnect the key and restart the test.

```
i@raspberrypi:~ $ rtl_test
Found 1 device(s):
 0: Realtek, RTL2838UHIDIR, SN: 00000001
Using device 0: Generic RTL2832U OEM
Found Rafael Micro R820T tuner
Supported gain values (29): 0.0 0.9 1.4 2.7 3.7 7.7 8.7 12.5 14.4 15.7 16.6 19.
20.7 22.9 25.4 28.0 29.7 32.8 33.8 36.4 37.2 38.6 40.2 42.1 43.4 43.9 44.5 48.0
49.6
[R82XX] PLL not locked!
Sampling at 2048000 S/s.
Info: This tool will continuously read from the device, and report if
samples get lost. If you observe no further output, everything is fine.
Reading samples in async mode...
^CSignal caught, exiting!
                           ctri+c
User cancel, exiting...
Samples per million lost (minimum): 0
pi@raspberrypi:~ $ ^C
```

F4GOH – KF4GOH

With the GQRX software, I tested the correct reception of the 88-108Mhz FM band.

e du volume 🛛 📈 Gqrx v2.12.1-52-gbcf 🗾 pi@raspberrypi: ~			V2 🛠 🚺 📣 16:31
			✓ Analog HDMI
Gqrx v2.12.1-52-gbcf8531 - rtl=0	¥ ^ X		1
<u>File T</u> ools <u>V</u> iew <u>H</u> elp			
▷ 📟 🖿 🔜 🖹 📟 ِ 💥 💠		Contrôle du volume 🛛 🗸 🗙 🗙	
$0\ 100.702.000 \xrightarrow{100.49.49.49.49.9}{32.685}$	Receiver Options Image: Constraint of the second sec	Lecture Enregistrement Périphériques de sortie	
-40 -60	Frequency 100702,000 kHz Filter width Normal	93% (1.78dB) Muet 100% (0dB)	
will what a second and a second s	Filter shape Normal -	🗱 GQRX sur Audio interne Mono analogique 🔹 🙆	•
-100 99.5 100.0 100.5	Mode WFM (stereo)	Audio Interne Mono analogique O Audio Interne Mono analogique	2
	AGC Medium	Muet 1009	
	Sauelch -150.0 dB A B		
	Noise blanker NB1 NB2		
	Input con Dessiver Ont EET Sett		D •
			n Pi
	Addio		
	-20 40 	•	
	Coincerner 5 20	Afficher : Applications 👻	\mathbf{D}
	Mute UDP Rec Play		5000
	DSP	HIIIN	

But the sound did not work on the 3.5 jack output.

1- Then right-click on the speaker icon and check Analog.

2- With the "audio pulse volume" control utility, right-click on "internal mono analog audio" and select the 2nd line.

I don't have time to test all the software. Each OM will have to carry out its own tests.

There is a help page on GitHub (registration required) where you can ask questions and a group of Raspberry Pi users around the radio.

https://github.com/dslotter/HamPi/issues

https://groups.io/g/RaspberryPi-4-HamRadio/



8.4 RadioPi Introduction

<u>RadioPi</u> is a Raspbian distribution created by BG6LH, BG1TPT, BI1EIH containing 15 pre-installed software packages. The advantage of this image disk is to propose a startup <u>wiki</u> (user manual) which is not the case for HamPi. On the other hand, this image has much less preinstalled software than HamPi. Hopefully RadioPi will benefit from the same number of software packages as HamPI in the future.

- WSJT-X, 2.2.2, The extreme weak-signal communication software
- JTDX, 2.1.0-RC150, More features than WSJT-X
- TQSL, 2.4.3, The ARRL LoTW QSL client
- Xlog, 2.0.14, A light weight logging program
- Fldigi, 4.1.01, Amateur Radio in Digital Modes
- CHIRP, daily20190104, Programming amateur radios, supporting a large number of manufacturers and models, such as Yaesu, Icom, Kenwood, Baofeng, TYT and so on.
- **QSSTV**, 9.2.6, Receiving and transmitting SSTV and HAMDRM(DSSTV)
- **GNU Radio Companion**, 3.7.13.4, GNU Radio is a free & open-source software development toolkit that provides signal processing blocks to implement software radios.
- **GQRX**, 2.11.5, Gqrx is an open source software defined radio receiver (SDR) powered by the GNU Radio and the Qt graphical toolkit.
- CubicSDR, 0.2.5, Cross-platform SDR application
- Direwolf, 1.4, A software "soundcard" modem/TNC and APRS en/decoder
- **Gpredict**, 2.3-33-gca42d22-1, A real-time satellite tracking and orbit prediction application
- VNC Server, 6.7.2, To remote control your rig remotely by VNC
- PulseAudio Preferences, 1.1, For simultaneous line-output, and transmit monitoring.



8.5 Image disk installation

From the https://radiopi.club/ website, download the back version of the image.

Downloads

Image file: image_2020-08-01-radiopi.zip

Then decompress the archive with the <u>7zip</u> utility.

image_2020	<u>08 0.</u>	Ouvrir Ouvrir dans une nouvelle fenêtre Partager avec Skype Extraire tout		Dossier compressé Document texte	1 322 827 Ko 1 Ko
		7-Zip CRC SHA Edit with Notepad++ Copy to pCloud Sync		Ouvrir archive Ouvrir archive Extraire les fichiers Extraire Ici	2020-08-01-radioni\"
	Ter Ter Fich Tau Extr 202	Envoyer par transfert 6% Extraction E:\wsprClub\tuto-r08-01-ra nps écoulé : 00:00:36 nps restant : 00:00:41 niers: 0 ux de compression : 34% raction 20-08-01-radiopi.img	adiop	i.zip Taille totale : Vitesse : Traité : Compressé:	4416 M 56 MB/s 2059 M 716 M
		Amère-plan		Pause	Annuler

To copy the image to an mSD card, use the same procedure as for HamPi (page 4 of the same document) with the Etcher utility.


8.6 Prise en main de radioPi

Start by configuring the country and keyboard by going to the "RaspberryPi configuration" menu.



F4GOH – KF4GOH

Perform the following operations to remove the fcitx utility that interferes with the use of the French keyboard.

sudo apt purge fcitx	
sudo apt autoremove	
sudo apt update	
sudo reboot	
	sudo apt purge fcitx sudo apt autoremove sudo apt update sudo reboot

	Add / Remove Software
Options	
Accessoires	 Pulseaudio terminal mixer based in pavucontrol pamix-1.6~git20180112.ea4ab3b-3 PulseAudio controller for the system tray pasystray-0.7.1-1
Communication	PulseAudio Volume Control pavucontrol-3.0-4
 Bureau KDE Autres bureaux Polices Jeux Graphisme Internet Anciennes application Localisation Multimédia Résouu 	Qt port of volume control pavucontrol pavucontr Authentification × × × Une authentification est nécessaire pour installer un logiciel Identité : pi Mot de passe :
Autres Autres Control Contr	Annuler Valider Pulse echargée 102,3 ko volume control tool (mixer) for the PulseAudio sound server. In contrast to classic mixer tools this one allows you to control both the volume of hardware devices and of each playback stream separately. It also allows you to redirect a playback stream to Licence unknown Source raspbian-stable-main separately. It also allows you to redirect a playback stream to Cancel Apply OK

GQRX with the rtl-sdr key works the first time.

		Gqrx 2.11.	5 - rtl=0			× ^	×
<u>F</u> ile <u>T</u> ools <u>V</u> iew <u>H</u> e	lp						
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👬 Sons sys	stème		<b>8</b> )	Mode	WFM (mono)	•	
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Muet	100% (0	)dB)				6	P ×

# Appendix

# <u>HamPi 1.2 – The Raspberry Pi Ham Radio Image by W3DJS</u>

# **General Ham Radio Applications**

HamLib - Ham Radio Control Libraries grig - graphical user interface to the Ham Radio Control Libraries CHIRP - Radio Programming Software APRS Message App for JS8Call - GUI to send APRS messages via JS8Call **QTel** - EchoLink client QSSTV - Slow Scan TV (e.g. "Fax") **Gpredict** - Satellite prediction FreeDV - Free digital voice vocoder **BlueDV** - Client for D-Star and DMR WsprryPi - WSPR software **ADS-B Flight Tracking Software** Pi3/4 Stats Monitor - by W1HKJ **VOACAP** - HF propagation prediction **GPS Support** wxtoimg - NOAA weather imaging software twHamQTH - an online callsign look up program twclock - a world clock and automatic ID for amateur radio operators acfax - Receive faxes using your radio and sound card colrconv - convers client with sound and neurses color support D-Rats 0.3.9 (by new maintainer Maurizio Andreotti) - A communication tool for D-STAR fbb - Packet radio mailbox and utilities gcb - Utility to calculate long and short path to a location glfer - Spectrogram display and QRSS keyer Xdx is a DX-cluster client **DXSpider** - DX Cluster Server fccexam - Study tool for USA FCC commercial radio license exams. gnuais / gnuaisgui - GNU Automatic Identification System receiver hamexam - Study guide for USA FCC amateur radio (ham radio) license examinations. hamfax - Qt based shortwave fax inspectrum - tool for visualising captured radio signals predict-gsat - Graphical Predict client splat - analyze point-to-point terrestrial RF communication links wwl - Calculates distance and azimuth between two Maidenhead locators AX.25 – Packet Radio drivers for ax.25 protocol linpac - terminal for packet radio with mail client **PyBOMBS** - GNU Radio install management system AMBEServer – AMBE vocoder chip support HamClock – GUI HamClock by WBOEW Adifmerg – command-line ADIF conversion utility

Lopora – QRSS Beacon Reception

<u>Universal Ham Radio Remote</u> (UHRR) – UHRR provides remote radio operation <u>RpiTx</u> -- Turns Raspberry Pi into low power transmitter <u>ACARS Decoder</u> – for tracking aircraft transponders <u>CygnusRFI</u> – RFI analysis tool for ground stations and radio telescopes) <u>Update Scripts</u> -- to update Fldigi suite and WSJT-X (so one doesn't have to wait for new HamPi release.)

# Antenna Ham Radio Applications

antennavis - Antenna Visualization Software <u>gsmc</u> - A GTK Smith Chart Calculator for RF impedance matching <u>nec2c</u> - Translation of the NEC2 FORTRAN source code to the C language <u>xnecview</u> - NEC structure and gain pattern viewer <u>yagiuda</u> - software to analyse performance of Yagi-Uda antennas

# **Digital Mode Ham Radio Applications**

WSJT-X - Weak Signal (FT8, FT4, etc.) by W1JT GridTracker - Graphical mapping companion program for WSJT-X or JTDX JTDX - Alternate client for Weak Signal (FT8, FT4, etc.) JS8Call - Messaging built on top of FT8 protocol by KN4CRD JS8CallTools - Get Grid coordinates using GPS (FLDigi is in its own section below.) gnss-sdr - GLONASS satellite system Software Defined Receiver linpsk - amateur radio PSK31/RTTY program via soundcard multimon - multimon - program to decode radio transmissions multimon-ng - digital radio transmission decoder psk31lx - a terminal based ncurses program for psk31 twpsk - a psk program

# Software Defined Radio

CubicSDR - Software Defined Radio receiver cutesdr - Simple demodulation and spectrum display program GQRX - Software defined radio receiver LeanSDR – Lightweight, portable software defined radio SDRAngel - SDR player lysdr - Simple software-defined radio SoapyAudio - Soapy SDR plugin for Audio devices SoapyHackRF - SoapySDR HackRF module SoapyMultiSDR - Multi-device support module for SoapySDR SoapyNetSDR - Soapy SDR module for NetSDR protocol SoapyRemote - Use any Soapy SDR remotely SoapyRTLSDR - Soapy SDR module for RTL SDR USB dongle SoapySDR - Vendor and platform neutral SDR support library SoapySDRPlay - Soapy SDR module for SDRPlay Support for RTL-SDR Support for <u>SDRPlay SDR</u> Support for HackRF SDR Support for AirSpy and AirSpy HF SoapySDRAirSpy- Soapy SDR module for AirSpy SDR SoapySDRFUNcube Dongle Pro+- Soapy SDR module for FUNCube Dongle Pro+ SoapySDRPlutoSDR- Soapy SDR module for Pluto SDR SoapySDROsmoSDR- Soapy SDR module for Osmo SDR SoapySDRRedPitaya- Soapy SDR module for Red Pitaya SDR SoapyUHD- Soapy SDR module for Ettus ResearchUHD SDR SoapySDRVOLKConverters - Support for VOLK-based type converters

# **APRS** Applications

Xastir - APRS GUI client / Digipeater / Igate YAAC - Yet Another APRS Client DireWolf - Software "soundcard" AX.25 packet modem/TNC and APRS encoder/decoder aprsdigi - digipeater for APRS aprx - APRS Digipeater and iGate soundmodem - Sound Card Amateur Packet Radio Modems

# FLDigi Application Suite from W1HKJ

flrig - Rig Control program which interfaces with fldigi fldigi - Digital Modes Communications flaa - RigExpert Antenna Analyzer Control Program flamp - File transmissions via Amateur Multicast Protocol flarg - ARQ data transfer utility for fldigi flcluster - Telnet client to remote DX Cluster Servers fllog - Logbook application which can use same data file as fldigi flmsg - Editor for ICS 213 Forms flnet - Net Control Assistant for Net Activities (Check-In Application) flpost - NBEMs post office flwrap - File encapsulation and compression for transmission over amateur radio flwkey - Winkeyer (or clone) control program for K1EL Winkeyer series

## Logging Applications

TrustedQSL - LotW client **CORlog** - Ham Radio Logging Application PyQSO - Logging software (written in Python) klog - The Ham Radio Logging program tlf - console based ham radio contest logger tucnak2 - VHF/UHF/SHF Hamradio contest log version 2 twlog - basic logging program for ham radio upload adif log – Upload only new log entries to LotW, eQSL.cc and ClubLog wsitx to n3fip - Logging adapter to allow WSJT-X to log to N3FJP xlog - GTK+ Logging program for Hamradio Operators

## WinLink Applications

Pat WinLink - WinLink for Raspberry Pi (and other platforms) **ARDOP** support for Pat WinLink ARDOP-GUI - Provides graphical representation of ARDOP connections Find ARDOP - Retrieves local ARDOP sources by KM4ACK Pat Menu 2 – Menu for Pat by KM4ACK **PMON** - a PACTOR[®] Monitoring Utility for Linux

# Morse Code Applications

aldo - Morse code training program cw - sound characters as Morse code on the soundcard or console speaker cwcp - Text based Morse tutor program xcwcp - Graphical Morse tutor program cwdaemon - morse daemon for the serial or parallel port ebook2cw - convert ebooks to Morse MP3s/OGGs ebook2cwgui - GUI for ebook2cw morse - training program about morse-code for aspiring radio hams morse2ascii - tool for decoding the morse codes from a PCM WAV file morsegen - convert file to ASCII morse code grg - High speed Morse telegraphy trainer xdemorse - decode Morse signals to text



# Raspberry Pi for HAM Radio Part 9



### Summary:

# Part 9: Radio test with Rpitx



Prerequisites: Part 4, Using the Raspbian Lite operating system without GUI.

9.1 Introduction					
9.2 Rx Installation software on PC	P. 3				
9.2.1 Zadig driver	P. 3				
9.2.2 Hdsdr	P. 4				
9.2.3 Sdrsharp	P. 7				
9.2.4 Sdr console	P. 9				
9.2.5 Sdruno	P. 12				
9.2.6 SDRAngel	P. 15				
9.3 Rpitx Installation	P. 17				
9.4 Rpitx 1st test	P. 18				
9.5 Others tests	P. 20				
9.5 Conclusion Version du 10/10/2020 V1.0	P 27				

#### 9.1 Introduction

In this tutorial, the aim is to implement a test bench to receive the radio frequency signals emitted by the Raspberry PI. Indeed, it has a specific output (GPIO 4) that can be used directly on an antenna. The Raspberry Pi can manage frequencies from 5 KHz to 1500 MHz.

The software suite managing the Raspberry PI internal RF transmitter called rpitx, is designed by Evariste Courjaud F5OEO.

Thus, the Raspberry Pi will be able to directly transmit a carrier, and various signals such as :

- A signal FM, SSB, code OOK ;
- An SSTV image, an OPERA signal, FT8;

- Etc...

However, to receive signals from the Raspberry PI, you will also need to set up a listening station. This one will be composed of a PC and an rtl-sdr key, without forgetting the installation of a reception software (a YouTube video is proposed for each SDR reception program).



(*) It is possible to use a 2nd Raspberry PI with the GQRX software as explained in part 3: Standard use of the RTL-SDR key.



### 9.2 Rx Installation software on PC

There are many PC reception software programs that use the rtl-sdr key. I can't list them all, but I'll go back to the installation of 5 of them. Most OMs that regularly use SDR reception have their preferred software. But those who have never installed and used SDR software can at least make a choice. The description above explains the installation of the software under Windows. I don't detail the in-depth use of the 5 software.

#### 9.2.1 Zadig driver

The common point of the 5 softwares is the specific driver for the rtl-sdr key. Go to https://zadig.akeo.ie/, then download the zadig 2.5.exe file (4.9 MB)

https://zadig.akeo.ie       Zadig	
USB driver installation made easy Zadig Device Options Help	
Benchmark Device           Driver         WinUSB (v6.1.7600.16385)           US8 ID         0408           FA2E           WCID 2         WINUSB	Fore Information     Writ58 (Must-1.0)     Bouter     Bouter     Writ58 (Microsoft)
4 devices found. <b>Zadig</b> is a Windows application that installs generic USB win32/libusb0.sys or libusb/c, to help you access USB de	Zadig v2.0.0.149
Download	
• Zadig 2.5 (4.9 MB)	

Connect the rtl-sdr key to a USB port on the PC. Make sure to always use the same USB port for the rtl-sdr key. Run the file *zadig-2.5.exe*, select Bulk-in, (Interface 0), then Install Driver.

Zadig	Zadig
Device Options Help	Device Options Help
Bulk-In, Interface (Interface 0)	Bulk-In, Interface (Interface 0)
Driver (NONE)       WinUSB (v6.1.7600.16385)         USB ID       0BDA         WCID ² Install Driver         WINUSB (Microsoft)	Driver WinUSB (v6.1.7600, 16385) WinUSB (v6.1.7600, 16385) WinUSB (v6.1.7600, 16385) WinUSB (lbusb) WinUSB (lbusb) WinUSB (lbusb) WinUSB (lbusb) WinUSB (lbusb) WinUSB (v6.1.7600, 16385) WinUSB (lbusb) WinUSB (lbusb) WinUSB (v6.1.7600, 16385) WinUSB (lbusb) WinUSB (lbusb) WinUSB (v6.1.7600, 16385) WinUSB (lbusb) WinUSB (v6.1.7600, 16385) WinUSB (lbusb) WinUSB (v6.1.7600, 16385) WinUSB (v6.1.7600, 16385) WinUSB (v6.1.7600, 16385) WinUSB (v6.1.7600, 16385) WinUSB (lbusb) WinUSB (lbusb) WinUSB (v6.1.7600, 16385) WinUSB (v6.1.7600, 16385) WinUSB (lbusb) WinUSB (v6.1.7600, 16385) WinUSB (v6.1.760
	Driver Installation
	The driver was installed successfully.
	Close

### 9.2.2 Hdsdr

Hdsdr is certainly the best-known software. It is very easy to install. An installation guide is available (How-to).

Go to http://www.hdsdr.de/, then download the HDSDR_install.exe file.



### Then download the file ExtIO_RTL2832.dll. http://hdsdr.de/download/ExtIO/ExtIO_RTL2832.dll

High Definition Software Defined Radio         Home       Whats New       FAQ       Hardware       Screenshots       Contact         For controlling / using a receiver directly from HDSDR you need to install the receiver's ExtIO DLL.       Visit your receiver's website (see below!) and get the appropriate DLL file archive (32Bit [x86] only).       Most sites refer the DLL as "Winrad ExtIO". It will be compatible with HDSDR.         Unpack all files from that archive into the installation directory of HDSDR       Centre (x86)\HDSDR\.         Any (monoband) receiver with output to soundcard can be used in HDSDR without any ExtIO DLL.       In this case, HDSDR will not be able to control the LO frequency.						
in this case, insolve will not be able to control the LO nequency.						
Red Pitaya	Website					
Red Pitaya RFHamFox 1 (Transfox)	Website DLL	December 02, 2016				
Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14	<u>Website</u> <u>DLL</u> Download	December 02, 2016 April 11, 2013				
Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB	Website DLL Download DLL <u>How-To</u>	December 02, 2016 April 11, 2013 March 20, 2017				
Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp)	Website DLL Download DLL How-To Website DLL / RTL TCP	December 02, 2016 April 11, 2013 March 20, 2017				
Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp) S9-C Rabbit SDR	<u>Website</u> <u>DLL</u> Download <u>DLL How-To</u> <u>Website DLL / RTL TCP</u> <u>Website</u>	December 02, 2016 April 11, 2013 March 20, 2017				
Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp) S9-C Rabbit SDR SDR-1	Website DLL Download DLL How-To Website DLL / RTL TCP Website Download	December 02, 2016 April 11, 2013 March 20, 2017 April 05, 2012				
Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp) S9-C Rabbit SDR SDR-1 SDR MK1 / SDR MK1.5 'Andrus'	Website         DLL         Download         DLL         How-To         Website         Website         Download         Website         Download         Website	December 02, 2016 April 11, 2013 March 20, 2017 April 05, 2012				
Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp) S9-C Rabbit SDR SDR-1 SDR MK1 / SDR MK1.5 'Andrus' SDRplay RSP1/RSP1A/RSP2/RSP2pro/RSPduo/RSPdx	Website         DLL         Download         DLL         How-To         Website         Website         Download         Website         Website         Website         Website         Website         Website	December 02, 2016 April 11, 2013 March 20, 2017 April 05, 2012				
Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp) S9-C Rabbit SDR SDR-1 SDR MK1 / SDR MK1.5 'Andrus' SDRplay RSP1/RSP1A/RSP2/RSP2pro/RSPduo/RSPdx Si570 based (Softrock, FA-SDR, FiFi-SDR, Lima-SDR, PM-SDR)	Website         DLL         Download         DLL How-To         Website DLL / RTL TCP         Website         Download         Website         Website         Website         Website         Website         Website	December 02, 2016 April 11, 2013 March 20, 2017 April 05, 2012				
Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp) S9-C Rabbit SDR SDR-1 SDR MK1 / SDR MK1.5 'Andrus' SDRplay RSP1/RSP1A/RSP2/RSP2pro/RSPduo/RSPdx Si570 based (Softrock, FA-SDR, FiFi-SDR, Lima-SDR, PM-SDR) Soft66	Website         DLL         Download         DLL       How-To         Website       Image: Comparison of the second	December 02, 2016 April 11, 2013 March 20, 2017 April 05, 2012				



#### F4GOH - KF4GOH Then install HDSDR (HDSDR install.exe).



Copy the ExtIO RTL2832.dll file to the HDSDR installation directory.



Then Run the HDSDR program.



Select the ExtIO RTL2832.dll file

Choose which External HW should be used	by H	DSDR			l	x
V Program Files (x86) + HD	SDR	<b>√</b> 4j	Rechercher	dans : Hl	DSDR	٩
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Emplacements récents	=	SttIO_RTL2832.c			10,	/10/2020
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😻 Dropbox						
詞 Bibliothèques						
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Images						
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Nom du fichier : ExtIC	_RTL2	2832.dll 👻	External IO H	IW DLL (E	xtIO_*.dl	I] <b>-</b>
			Ouvrir	<b> </b>	Annule	r

Test reception by listening to the <u>FM band</u> (88-108Mhz)





#### F4GOH – KF4GOH 9.2.3 Sdrsharp

Go to https://airspy.com/download/, then download the file sdrsharp-x86.zip Then unzip the zip. There is no installation program like hdsdr.



# **SDR Software Download**

### Windows SDR Software Package (Change log)

				_	-
	000	vni	oa		1
E					3

Download the file RelWithDebInfo.zip

http://osmocom.org/attachments/download/2242/RelWithDebInfo.zip

Unzip the zip again. Copy the file rtlsdr.dll located in RelWithDebInfo\rtl-sdr-release\x32 to the directory containing SDRsharp.

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	🚳 sdriq.dll	10/10/2020 10:20	Extension de l'app	14 Ko				a pthread/(C2-w22 dll	10/10/2020 10:45	Extension de l'app	59 Ko	
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- Diopbox	SDRSharp.CollapsiblePanel.dll	10/10/2020 10:20	Extension de l'app	20 Ko			- Diopbox		10/10/2020 10:45	Application	16 Ko	
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Documents	SDRSharp.Diagnostics.dll	10/10/2020 10:20	Extension de l'app	15 Ko			Documents		10/10/2020 10:45	Application	26 Ko	
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I ANTHONY-PC	🚳 shark.dll	10/10/2020 10:20	Extension de l'app	331 Ko			ANTHONY-PC					
	SpectrumSpy.exe	10/10/2020 10:20	Application	72 Ko								
	SpectrumSpy.exe.config	10/10/2020 10:20	Fichier CONFIG	1 Ko								
TT LIVEDON	🚳 SRDLL.dll	10/10/2020 10:20	Extension de l'app	66 Ko		-	PT- LIVEDOX					

Run SDRSharp as administrator (right click)

🔗 SDRSharp.exe		10/10/2020 10:20	-ation	649 Ko
SDRSharp.exe.cor		Ouvrir	CONFIG	9 Ko
SDRSharp.Freque	۲	Exécuter en tant qu'administrateur	ion de l'app	26 Ko
	ß	Partager avec Skype		25.17



The first time SDRSharp is launched, the NET Framework may not be installed. In this case a WEB page opens automatically. Download the ndp48-web.exe file, then install the framework.



#### F4GOH – KF4GOH

#### 9.2.4 Sdr console

Go to https://www.sdr-radio.com/download and download the SDR-Radio V3.0.25, 64-bit,

2020-09-29_1346.exe file or a more recent version.

#### Choose the Microsoft 64-bit link.

🔍 🔒 https://www. <b>sdr-radio.com</b> /download	🗐 🚥 😎 🏠 🔍 Rechercher
Home 🗸 Console 🗸 Server	Radios - Satellites - Support - Gallery FAQ Blog
DOWNLOAD ~	(←) → C* (h)       (□) A https://onedrive.live.com/?       (□) A Rechercher       (□) A No.25, 64-bit, 2020-09-29, 1346(1).exe
2 0 25	Temps restant : 1 min 47 s - 59,3 sur 157 Mo (977 Ko/s)     Connexton (8)       Afficher tous les télécharaements     III ~ (1)
3.0.25	Partagés > 3.0 Kits > 3.0.25
September 29th, 2020 Release notes	
32-Bit Google Microsoft Dropbox	SDR-Radio V3.0.25, 64-bit _s R 29 sept.
64-Bit Google Microsoft Dropbox	

When running the installer (setup), the Visual C++ Redistributable libraries may not be installed. In this case accept this additional installation.

SDR-Radio V3.0.25, 64-bit, 2020-09-29_1346(1).exe 10/10/2020 11:14 Application	160 615 Ko
SDR-Radio V3.0.25, 64-bit Setup	🕌 Installation de Microsoft Visual C++ 2015-2019 Redistributable ( 🗖 🖻 🕺
Installing Please wait while SDR-Radio V3.0.25, 64-bit is being installed.	Microsoft Visual C++ 2015-2019 Redistributable (x64) - 14.24.28127
	Progression de l'installation
Show details	En cours de {e2ee15e2-a480-4bc5-bfb7-e9803d1d9823}
The Microsoft Visual C++ 2019 Redistributable Package is required by this software and will now be installed.	
ОК	Annuler
NSI5 Installer	



Help for configuring the rtl-sdr key can be found in the Radio RTL Dongles menu. https://www.sdr-radio.com/rtl-dongles

🛞 Software Defined Radio 🛛 🗙 🕂			
$\leftrightarrow$ $\rightarrow$ C ⁴ $\textcircled{0}$ $\textcircled{0}$ $\textcircled{1}$ https://w	ww.sdr-radio.com/receivers		
Home ~ Console ~ Server ~	Radios ^ Satellites ~	Support ~ Gallery	FAQ Blog
	N-Z <	Perseus	
	Airspy >	Red Pitaya	
	1 ANAN (Apache Labs) >	RFspace	
	ELAD >	RTL Dongles	
	LimeSDR >	RX-666	
	Pluto >	\$DRplay	
		WiNRADIO	

Run the sdr program called console @ Console

Select the rtl-sdr key by following steps 1 to 6.

🚛 🟦 🖻 🕑 💷 😋 😭 🕶	SDR Console v3.0.25
Home View Receive Transm	t Rec/Playback Favourites Memories Tools Help
Select Radio	Image: Second
Receive 👻 X	The Select Radio
RX 1 48 kHz 305.498.000 Haut-parleurs (Realtek High Definition Audio)	All       Local       Server       Add       Edit       Delete       Text viewer         Name       Model       Frequency       Serial       Address         PlutoSDR       PlutoSDR       0 - 3800 MHz       104473dc59930013eeff3000ad622a84b6       104473dc59         ANAN (OpenHPSDR)       bladeRF       ELAD       Ettus Research       Ettus Research         FUNcube Dongles       HackRF       HackRF       HackRF       HackRF
305.480     305.500     305.520       Mode     ✓       Filter     ✓       AGC: Off     ✓       Off     Fast     Med       Slow     ▲ 😂 🖉       CW: Off     ✓       Noise Blanker: Off     ✓       Noise Reduction: Off     ✓       Notice Off     ✓	Bandwidth:       →       1       Icom s-Life         Add Definitions       ▲utostart options       ImesDR         Add Definitions       ▲utostart options       Online help         Pitro SDR 3       Pitro SDR 3       Pitro SDR 3         Select 'Add' to add this definition to the list.       Soci 800       Box RC 666/RX-888       USB         ▲ Add       Add this definition to the list.       Fit Add       Soci 800       Soci 800         ▲ Add       Add this definition to the list.       Fit Add       Soci 800       Soci 800         ▲ Add       Add this definition to the list.       Fit Add       Soci 800       Soci 800         ▲ Add Add this definition to the list.       Fit Add       Soci 800       Soci 800         ▲ Add His definition to the list.       Fit Add       Soci 800       Soci 800         ▲ Add His definition to the list.       Fit Add       Soci 800       Soci 800         ▲ Add His definition to the list.       Fit Add       Fit Add       Soci 800         ▲ Add His definition to the list.       Fit Add       Fit Add       Fit Add         ▲ Add His definition to the list.       Fit Add       Fit Add       Fit Add         ▲ Add His definition to the list.       Fit Add       Fit Add       Fit Add      <

Continue with steps 7 to 9.

🔳 Radio	Definitions			<b>— X</b>	Select R	adio				×
Q Se	arch 👻 🛛 🗛 🖌	Edit Delete		Text viewer	AII	Local ¢	⇒ Server			
Enable	Name	Model	Frequency	Serial	Name		Model	Frequency	Serial	Address
	PlutoSDR	PlutoSDR	0 - 3800 MHz	104473dc59	RTL Dongi	2 USB - R8201	RTL Dongle USB - R8201	50 - 2000 MHZ	0000001	Realtek::RTI
<b>V</b>	RTL Dongle USB - R820T	RTL Dongle USB - R820T	50 - 2000 MHz	00000001						
Show 1 Colored and the second seco	T these options onverter selection Edit vert spectrum ave Cancel	) <u>Autostart option</u> <u>Online help</u>	5	•	Bandwidth:	250 kHz	<b>•</b>		De	► finitions

Test reception by listening to the FM band (88-108Mhz)



#### Go to https://www.sdrplay.com/windl2.php, then download the

SDRplay_SDRuno_Installer_1.22.exe file or a more recent version.

← → ⊂ ŵ	🛛 🔒 https://www.sdrplay.com/windl2.php	•••	$\overline{\mathbf{A}}$	»	=
	SORola				
- Windows					•
<b>★</b> Window	S	6		ownioa	ad

Then download the file **ExtIO_RTL2832.dll** the same file as for Hdsdr. http://hdsdr.de/download/ExtIO/ExtIO_RTL2832.dll

High Definition Software Defined Radio Home Whats New FAQ Hardware Screenshots Contact						
For controlling / using a receiver directly from HDSDR you need to install the receiver's ExtIO DLL. Visit your receiver's website (see below!) and get the appropriate DLL file archive (32Bit [x86] only). Most sites refer the DLL as "Winrad ExtIO". It will be compatible with HDSDR. Unpack all files from that archive into the installation directory of HDSDR f.e. C:\Program Files (x86)\HDSDR\. Any (monoband) receiver with output to soundcard can be used in HDSDR without any ExtIO DLL.						
Any (monoband) receiver with output to soundcard can be used in F In this case, HDSDR will not be able to control the LO frequency.	IDSDR without any Exilo					
Any (monoband) receiver with output to soundcard can be used in F In this case, HDSDR will not be able to control the LO frequency.	Website					
Any (monoband) receiver with output to soundcard can be used in F In this case, HDSDR will not be able to control the LO frequency. Red Pitaya RFHamFox 1 (Transfox)	Website DLL	December 02, 2016				
Any (monoband) receiver with output to soundcard can be used in F In this case, HDSDR will not be able to control the LO frequency. Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14	Website DLL Download	December 02, 2016 April 11, 2013				
Any (monoband) receiver with output to soundcard can be used in F In this case, HDSDR will not be able to control the LO frequency. Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB	Website DLL Download DLL How-To	December 02, 2016 April 11, 2013 March 20, 2017				
Any (monoband) receiver with output to soundcard can be used in F In this case, HDSDR will not be able to control the LO frequency. Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp)	Website DLL Download DLL How-To Website DLL / RTL TCP	December 02, 2016 April 11, 2013 March 20, 2017				
Any (monoband) receiver with output to soundcard can be used in F In this case, HDSDR will not be able to control the LO frequency. Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp) S9-C Rabbit SDR	Website DLL Download DLL How-To Website DLL / RTL TCP Website	December 02, 2016 April 11, 2013 March 20, 2017				
Any (monoband) receiver with output to soundcard can be used in F In this case, HDSDR will not be able to control the LO frequency. Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp) S9-C Rabbit SDR SDR-1	Website DLL Download DLL How-To Website DLL / RTL TCP Website Download	December 02, 2016 April 11, 2013 March 20, 2017 April 05, 2012				
Any (monoband) receiver with output to soundcard can be used in F In this case, HDSDR will not be able to control the LO frequency. Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp) S9-C Rabbit SDR SDR-1 SDR MK1 / SDR MK1.5 'Andrus'	Website DLL Download DLL How-To Website DLL / RTL TCP Website Download Website	December 02, 2016 April 11, 2013 March 20, 2017 April 05, 2012				
Any (monoband) receiver with output to soundcard can be used in F In this case, HDSDR will not be able to control the LO frequency. Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp) S9-C Rabbit SDR SDR-1 SDR MK1 / SDR MK1.5 'Andrus' SDRplay RSP1/RSP1A/RSP2/RSP2pro/RSPduo/R <u>SPdx</u>	Website         DLL         Download         DLL         Website DLL / RTL         Website         Download         Website         Website         Website         Website	December 02, 2016 April 11, 2013 March 20, 2017 April 05, 2012				
Any (monoband) receiver with output to soundcard can be used in F In this case, HDSDR will not be able to control the LO frequency. Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp) S9-C Rabbit SDR SDR-1 SDR MK1 / SDR MK1.5 'Andrus' SDRplay RSP1/RSP1A/RSP2/RSP2pro/RSPduo/RSPdx Si570 based (Softrock, FA-SDR, FiFi-SDR, Lima-SDR, PM-SDR)	Website         DLL         Download         DLL How-To         Website DLL / RTL TCP         Website         Download         Website         Website         Website         Website         Website         Website         Website	December 02, 2016 April 11, 2013 March 20, 2017 April 05, 2012				
Any (monoband) receiver with output to soundcard can be used in F In this case, HDSDR will not be able to control the LO frequency. Red Pitaya RFHamFox 1 (Transfox) RFSPACE SDR-IQ / SDR-14 RTLSDR (DVB-T/DAB with RTL2832) USB RTLSDR (DVB-T/DAB with RTL2832) over Network (rtl_tcp) S9-C Rabbit SDR SDR-1 SDR MK1 / SDR MK1.5 'Andrus' SDRplay RSP1/RSP1A/RSP2/RSP2pro/RSPduo/RSPdx Si570 based (Softrock, FA-SDR, FiFi-SDR, Lima-SDR, PM-SDR) Soft66	Website         DLL         Download         DLL         Website DLL / RTL         Website         Download         Website         Website         Website         Website         Website         Website         Website         Website         Website	December 02, 2016 April 11, 2013 March 20, 2017 April 05, 2012				

F4GOH – KF4GOH

Copy the ExtIO_RTL2832.dll file to the Documents directory

Organiser 🔻 🛛 Inclur	e dans la bibliothèque 🔻 🛛 Partager avec 👻
☆ Favoris	Nom
🔤 Bureau 🗐 Emplacements re	ExtIO_RTL2832.dll lien.txt
OneDrive	SDRplay_SDRuno_Installer_1.22.exe
🗢 Бгорвох	
🔚 Bibliothèques	•
Bibliothèques	

Execute the SDRuno (Extio) file, installed on the hard disk. (Search when you don't know where the program was installed). Note that there is a manual in pdf (SDRuno User manual) and it is the only manual installed with the program among the 5 softwares presented here.

-	
. #:⇔ SDRuno (EXTIO)	
🚳 Reset SDRuno Reg	istry Settings
<del>‴</del> ⇔ SDRuno	
📓 SDRuno User Man	ual
🕬 Uninstall SDRuno	

Check that the ExtIO_RTL2832.dll file is correctly taken into account so that the software can access the rtl-sdr key.

SETT. MA SDRuno MAIN	Main Settings
OPT SR REC PANEL In SR: 2400000	INPUT CAL OFFSET TMATE ORIG MISC
0 SP1 SP2 RX	WME Input Device Microphone (Realtek
	ASIO Driver
10/10/2020 21:30:07 MEM PAN Sdr: 0% Sys: 5%	Loaded ExtIO: ExtIO_RTL2832
Default Workspace	



#### 2nd check with the OPT menu



The SP1, SP2 and RX buttons display the 3 windows to set the frequency and reception mode.



The configuration described here comes from the site radioforeveryone.com

A video describing the configuration process is also available on <u>voutube</u>

### 9.2.6 SDRAngel

Go to https://github.com/f4exb/sdrangel/releases, then download the file sdrangel-4.19.0win64.exe or a more recent version.

https://github.com/f4exb/sdrangel/releases	110 %
Input or Rx side	
Output or Tx side	
Binary artifacts	
For more details on artifacts and their contents please rea Note that Ubuntu .deb package is for 20.04.	d the quick start in the Wiki.
<ul> <li>✓ Assets 4</li> </ul>	
<ul> <li>✓ Assets 4</li> <li>Ø sdrangel-377-master.tar.gz</li> </ul>	10.8 MB
<ul> <li>Assets 4</li> <li>Sdrangel-377-master.tar.gz</li> <li>sdrangel-4.19.0-win64.exe</li> </ul>	10.8 MB 67.3 MB
<ul> <li>Assets 4</li> <li>sdrangel-377-master.tar.gz</li> <li>sdrangel-4.19.0-win64.exe</li> <li>Source code (zip)</li> </ul>	10.8 MB 67.3 MB

#### **Run Installer**

👒 sdrangel-4.19.0-win64.exe	10/10/2020 12:24	Application	68 941 Ko
S Installation de SDRangel			×
Instal Veuill	lation en cours ez patienter pendant l'installation d	e SDRangel.	
Extraction : vcredist_msvc2017_x6	64.exe 53%		
Plus d'infos			
Nullsoft Install System v3.04			_
	< Précédent Suiv	ant > Annuler	



SDRangel Once the program is launched, select the menu with the arrows and choose the rtl-sdr key. Then click on the triangle.





I am not a specialist of this software. To tell the truth, I don't really know how to use it. The F4EXB author has made a wiki. Maybe an internet search on Youtube will also help you.



#### 9.3 Installation de rpitx

As <u>F5OEO</u> indicates in its project, Raspbian Lite must be used. To do so, please refer to part 4 of my tutorials. The installation of command line rpitx does not pose any problem.

```
sudo apt-get update
sudo apt-get install git
git clone https://github.com/F50E0/rpitx
cd rpitx
./install.sh
```

Allow 3 to 5 minutes to download the dependencies (depending on the speed rate) and install for a Raspberry Pi 3.

```
pi@raspberrypi:~ $ git clone https://github.com/F50E0/rpitx
Clonage dans 'rpitx'...
remote: Enumerating objects: 65, done.
remote: Counting objects: 100% (65/65), done.
remote: Compressing objects: 100% (50/50), done.
remote: Total 1459 (delta 24), reused 49 (delta 15), pack-reused 1394
Réception d'objets: 100% (1459/1459), 10.57 MiB | 727.00 KiB/s, fait.
Résolution des deltas: 100% (818/818), fait.
pi@raspberrypi:~ $ cd rpitx/
pi@raspberrypi:~/rpitx $ ./install.sh
```

You have to accept the modification of the /boot/config.txt file, otherwise rpitx will be unstable when tx.



I was able to test rpitx on an RPI3 without any problem. You will have to restart the Raspberry Pi before any use.

sudo reboot

Putty's classic message when restarting RPI



#### 9.4 Rpitx 1st test

F5OEO had the great idea to add a quick test menu called ./easytest.sh in its software suite.

```
login as: pi
pi@192.168.1.10's password:
Linux raspberrypi 5.4.51-v7l+ #1333 SMP Mon Aug 10 16:51:40 BST 2020 armv7l
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Sun Oct 11 09:32:47 2020
SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to set
a new password.
pi@raspberrypi:~ $ cd rpitx/
pi@raspberrypi:~/rpitx $ ./easytest.sh
```

Choose the base frequency for testing.

Choose output Frequency	Rpitx transmit Frequency (in MHz) Default is 434 MHz	
434.0	<li>Ann</li>	uler>

The first very classical test is to transmit a carrier and to check in the windows of the SDR software the good reception of the signal.

		Rpitx on 434.0 MHz				
Range frequency · 50kHz-16Hz Choose your test						
nange rrequent	oy . coxinz ion.	2. Choose your cest				
_						
F	Set frequency	Modify frequency (actual 434.0 MHz)	1			
0	Tune	Carrier				
1	Chirp	Moving carrier				
2	Spectrum	Spectrum painting				
3	RfMyFace	Snap with Raspicam and RF paint				
4	FmRds	Broadcast modulation with RDS	100			
5	NFM	Narrow band FM	100			
6	SSB	Upper Side Bande modulation				
7	AM	Amplitude Modulation (Poor quality)				
8	FreeDV	Digital voice mode 800XA				
9	SSTV	Pattern picture				
10	D Pocsag	Pager message	Ţ			
	<0k>	<annuler></annuler>				

#### F4GOH – KF4GOH

Internet Prove Proventies				Protocol Protocol P		
Sert.         F         PA02	Span 24 KHz FFT 512 Ptz RBW 46,88	Comparison of the second	DW         DEARLING INCOMMENT           ISTEP.         Image: Comparison of the comment of the commentof the comment of the comment of	BXYNL         RCR           0         -91.1 dBm         RMS           LISS         USB         USB           TER         NB         USB           20K         NBN           20K         NBN           NB075         A6C           075         FAST           MID         SLOW	Image: Non-Display state         X           160         80         740           30         20         177           15         712         10           2         Clear         Enter	
SP WF SP+WF	< 200M >	s ling a	nd selecting the PI4 branch in the mar	nner you suggested. T	he app starts	
SETT.		SDRuno MAIN SP		8-	<b>80</b> - ×	
20 20 20 20 20 20 20 20 20 20	i in via via via via via via		ramantharenariantarian			
-125 -130		e P P	i@raspberrypi: ~/rpitx			0
43000 -	433200 433400 433600 43	3800 43400	Transmitting	t 0 Tune on 434.0	MHz	
SP WF SP+WF CO	мво	< 200M >			N	

Chirp mode, the carrier moves sinusoidally and the harmonics also.



## 9.5 Others tests

Some programs can be accessed individually.

pi@raspberrypi:~/rpitx \$ ls						
BBC.jpg	morse	README.md	testfmrds.sh			
corel8	Not_working_with_v2	rpitx	testfoxhunt.sh			
csdr	pichirp	rtlmenu.sh	testfreedv.sh			
csdrpizero.diff	picture.rgb	sampleaudio.wav	testfsq.sh			
doc	picture.U	sendiq	testnfm.sh			
dvbrf	picture.V	sendook	testopera.sh			
easytest.sh	picture.Y	snap2spectrum.sh	testpocsag.sh			
fm2ssb.sh	pifmrds	snapsstv.sh	testspectrum.sh			
foxhunt	pifsq	spectrumpaint	testssb.sh			
freedv	pift8	src	testsstv.sh			
ft8menu.sh	piopera	sv1afnfilter.sh	testvfo.sh			
install.sh	pisstv	testam.sh	transponder.sh			
LICENCE	pocsag	testchirp.sh	tune			
ni@rasnberruni •~	/mity \$					

#### 9.5.1 Fox hunt



pi@raspberrypi:~/rpitx \$ ./foxhunt usage : foxhunt frequency(Hz) frequency shift(Hz) pi@raspberrypi:~/rpitx \$ sudo ./foxhunt 434000000 500 ^CCaught signal - Terminating 2 ->touches CTRL+C pi@raspberrypi:~/rpitx \$

# F4GOH – KF4GOH 9.5.2 On-off keying TXing

**On-off keying** is an 1-or-0 transmission used in home automation systems such as garage door control.

```
pi@raspberrypi:~/rpitx $ ./sendook -h
sendook : a program to send On-Off-Keying with a Raspberry PI.
usage : sendook [options] "binary code"
Options:
-h : this help
-v : verbose (-vv : more verbose)
-d : dry run : do not send anything
-f freq : frequency in Hz (default : 433.92MHz)
-0 nb : duration in microsecond of 0 bit (by default : 500us). Use integer only.
-1 nb : duration in microsecond of 1 bit (by default : 250us)
-r nb : repeat nb times the message (default : 3)
-p nb : pause between each message (default : 1000us=1ms)
"binary code":
  a serie of 0 or 1 char (space allowed and ignored)
Examples:
  sendook -f 868.3M -0 500 -1 250 -r 3 1010101001010101
    send 0xaa55 three times (with the default pause of 1ms) on 868.3MHz. A 0 is a gap of
500us, a 1 is a pulse of 250us
pi@raspberrypi:~/rpitx $
```

Fortunately the help is present with the -h

```
pi@raspberrypi:~/rpitx $ sudo ./sendook 10101010101010101
Frequency set to : 433920000Hz
Bit duration 0 : 500us ; 1 : 500us
Send message 3 times with a pause of 1000us
Message successfuly transmitted
pi@raspberrypi:~/rpitx $
```

It is not necessary to specify the frequency. By default, the reception frequency of cheap modules is 433.92 MHz. That's good, the result displayed with the oscilloscope corresponds perfectly to the data in console.



#### 9.5.3 FT8 transmission

A specific menu has been created: pi@raspberrypi:~/rpitx \$ ./ft8menu.sh

Choose FT8 output Frequency (in MHZ) Default is 14.074MHZ	
<ok> <annuler></annuler></ok>	
Hamradio call	
<ok> <annuler></annuler></ok>	
Hamradio grid Type your grid on 4 char:ex JN06	
<ok> <annuler></annuler></ok>	
Offset Frequency Choose FT8 offset (10-2600Hz) Default is 1240Hz	
<ok> <annuler></annuler></ok>	
Time slot Which timeslot (current) 1 ?	
<1>	
Choose your item O CQ Calling CQ on 14.074 1 ENTER OM Input OM call 2 dB Answer Db 3 RRR Answer RRR 4 Grid Answer with grid 5 R+dB Answer with R+level 6 73 Answer with 73 7 Text Free text 8 Refine Adjust offset/slot	
<ok> <annuler></annuler></ok>	

With SDRuno you will have to use the Direct Sampling mode with another dll file by using the configuration on page 13.

Link of the <u>rtl-sdr</u> web page specifying the page of the forum proposing the file **ExtIO_RTLSDR_u8.dll** 

https://www.rtl-sdr.com/forum/download/file.php?id=926

Il faudra copier les 2 fichiers dll dans le répertoire Documents	ExtIO_RTLSDR_u8-1.1.1.5	
ExtIO_RTLSDR_u8.dll et rtlsdr.dll	Nom ExtIO_RTLSDR_u8.dll readme.txt rtlsdr.dll	

As soon as you start " SDRuno (EXTIO), select the ExtIO_RTLSDR_u8.dll file, in order to be able to listen to the HF bands.



#### F4GOH – KF4GOH

#### Starting a QC from the FT8 rpitx menu



The signal must appear in the "waterfall".

To decode the FT8 transmission, a "virtual audio bridge" (Virtual audio cable) will have to be installed.

An explanation can be found on the <u>leradioscope.fr</u> site, or YouTube video

Start by downloading the file <u>VBCABLE_Driver_Pack43.zip</u>



Installer les Drivers en mode administrateur (clique droit)



#### Some screenshots from the video



#### Then configure SDRuno

SETT. EXW SDRUTO RX CONTROL RSYN1 MCTR TCTR	RX Settings 0 - 0
	AGC OUT SAM/HP RDS CAT ORIG
	WME Output Device
MODE AM SAM FM CW DSB LSB USB USER	CABLE Input (VB-Audio 🔫
VFO - QM FM MODE CW OP FILTER NB 160 80 40	Output Routing
VFO B B > A WFM SWFM ZAP 12K 24K NBN 430 20 617	LEFT RIGHT BOTH
QMS QMR CWAFC NBOFF 30 20 11	
-113 dB AGC 15 12 10	Lock Output Fractional Resampler
SQLC OFF FAST	
MUTE MED SLOW 2 Clear Enter	

Finish by configuring the reception source in the WSJT-X software.

Settings							? ×
General	Radio	Audio	Tx Macros	Reporting	Frequencies	Colors	Advanced
Input:		utput (VB-A	Audio Virtual				▼ Mono ▼
Output:	Haut-parl	leurs (Real	tek High Def				▼ Mono ▼



As soon as you switch to repeat transmission, the HF signal is present in both waterfalls (SDRuno and Wsjtx).



It is the same for the decoding of an <u>SSTV image</u> (<u>MMSSTV</u> installation help).



**Objective:** A Pocket PC in FM broadcasts on 145.525 Mhz. Rpitx equipped with an rtl-sdr key receives the transmission and copies the signal in Fm or SSB on 14.100Mhz.



To access the transponder function, just use the following specific script.

## pi@raspberrypi:~/rpitx \$ ./rtImenu.sh

		Rpitx with RTLSDR	
Choose your	test		
	0 Record	Record spectrum on 145.525	
	1 Play	Replay spectrum	
	2 Transponder	Transmit 145.525 to 14.100MHZ	
	3 Fm->SSB	Transcode FM 145.525 to 14.100MHZ	
	4 Set frequency	Modify frequency (actual 145.525 Mhz)	

Menu 4 allows you to choose the input and output frequency.

## 9.5 Conclusion

The **rpitx** project is very interesting and will allow to understand and experiment with different data transmissions without spending anything. This project also allowed me to make a synthesis of SDR software installation under Windows to have a quick guide when I will have forgotten everything in 6 months. If an amplifier is used, it will be necessary to think about the low-pass filter to eliminate the harmonics generated by the RF output of the Raspberry.



# Raspberry Pi for HAM Radio Part 10



Summary:

# Part 10: Streaming server with Rtl sdr.





Prerequisite: Part 4: Using the Raspbian Lite operating system.

10.1 Presentation of the server / client set	P. 2				
10.2 Rtl-sdr drivers Installation					
10.3 Rtl_tcp server with 4 SDR softwares	P. 7				
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### **10.1 Presentation of the server / client set**

In this tutorial, the idea is to implement a Raspberry Pi as a server for remote listening on a PC. Unlike the tutorial 6 on OpenWebRX, the client (PC) uses one of the 4 softwares (Hdsdr, Sdrsharp, Sdr console, Sdruno). The advantage is that the listening will be much more fluid than with OpenWebRX, while having all the features of the SDR reception software. The communication between the client and the server will be done in TCP/IP.



Of course, it is possible to have a connection between the server and the client via the Internet. In this case it will be necessary to configure the ADSL BOX as described in tutorial 6.8: Accessing the web SDR from outside the QRA.



### 10.2 Rtl-sdr drivers Installation

This time, I used the two following links to install drivers for the RTL-SDR V3 key. This version has improvements compared to the driver described in tutorial 3.

https://www.rtl-sdr.com/rtl-sdr-blog-v-3-dongles-user-guide/

https://github.com/rtlsdrblog/rtl-sdr-blog

Use Raspbian Lite without GUI. Remember to execute these commands if it is not already done.

# sudo apt update sudo apt upgrade sudo apt install git

Recovering the project:

git clone git://github.com/rtlsdrblog/rtl-sdr-blog.git



Install the libraries.

```
sudo apt install build-essential cmake usbutils libusb-1.0-0-dev
```


Type these commands in the order:

cd rtl-sdr-blog/
mkdir build
cd build
cd build
cmake -DINSTALL_UDEV_RULES=ON -DDETACH_KERNEL_DRIVER=ON ../
pi@raspberrypi:~ \$ cd rtl-sdr-blog/
pi@raspberrypi:~/rtl-sdr-blog \$ mkdir build
pi@raspberrypi:~/rtl-sdr-blog \$ cd build/
pi@raspberrypi:~/rtl-sdr-blog \$ cd build \$ cmake -DINSTALL UDEV RULES=ON -DDETACH KER



sudo make install

pi@raspberrypi:~/rtl-sdr-blog/build \$ sudo make install Scanning dependencies of target rtlsdr_shared 3%] Building C object src/CMakeFiles/rtlsdr_shared.dir/librtlsdr.c.o 6%] Building C object src/CMakeFiles/rtlsdr_shared.dir/tuner_e4k.c.o 9%] Building C object src/CMakeFiles/rtlsdr_shared.dir/tuner_fc0012.c.o 12%] Building C object src/CMakeFiles/rtlsdr_shared.dir/tuner fc0013.c.o 15%] Building C object src/CMakeFiles/rtlsdr shared.dir/tuner 18%] Building C object src/CMakeFiles/rtlsdr shared.dir/tuner 21%] Linking C shared library librtlsdr.so [ 21%] Built target rtlsdr_shared Scanning dependencies of target convenience_static [ 25%] Building C object src/CMakeFiles/convenience static.dir/convenience/conve [ 28%] Linking C static library libconvenience static.a 28%] Built target convenience static



## sudo nano /etc/modprobe.d/rtlsdr-blacklist.conf

pi@raspberrypi:~/rtl-sdr-blog/build \$ sudo nano /etc/modprobe.d/rtlsdr-blacklist.conf

```
blacklist dvb_usb_rtl28xxu
blacklist rtl2832
blacklist rtl2830
blacklist dvb_usb_rtl2832u
blacklist dvb_usb_v2
blacklist dvb_core
```

Copy and paste the above list into the nano editor. Reminder right click : to paste the text in the nano editor.





Restart the Raspberry PI: pi@raspberrypi:~/rtl-sdr-blog/build \$ sudo reboot

sudo reboot

Verification: Plug the rtl-sdr key into a USB port on the Raspberry Pi. Connect the rtl-sdr key to the Raspberry Pi on a free USB port.



Check the presence of the rtl-sdr key. With LXTerminal or Putty, type the following command line:

lsusb

Locate the rtl-sdr key: RTL238 DVB-T

#### **Raspberry Pi 3 :**

pi@1	pi@raspberrypi:~ \$ lsusb							
Bus	001	Device	004:	ID	Obda:2838	Realtek Semiconductor Corp. RTL2838 DVB-T		
Bus	001	Device	003:	ID	0424:ec00	Standard Microsystems Corp. SMSC9512/9514 Fast		
Ethe	ernet	t Adapte	er					
Bus	001	Device	002:	ID	0424:9514	Standard Microsystems Corp. SMC9514 Hub		
Bus	001	Device	001:	ID	1d6b:0002	Linux Foundation 2.0 root hub		

#### **Raspberry Pi 4 :**

pi@1	pi@raspberrypi:~ \$ lsusb							
Bus	002	Device	001:	ID	1d6b:0003	Linux Foundation 3.0 root hub		
Bus	001	Device	003:	ID	0bda:2838	Realtek Semiconductor Corp. RTL2838 DVB-T		
Bus	001	Device	002:	ID	2109:3431	VIA Labs, Inc. Hub		
Bus	001	Device	001:	ID	1d6b:0002	Linux Foundation 2.0 root hub		

With LXTerminal or Putty, type the following command line : (be careful, underscore key)

rtl_test

The rtl-sdr key should be recognized, if not, disconnect and reconnect the key and restart the test.

Exit the program by pressing the Ctrl key and the c key at the same time. (Ctrl+c)

#### 10.3 Rtl_tcp server with 4 SDR softwares

## 10.3.1 Sdrsharp

Install the Sdrsharp software described in tutorial 9.2.3, page 7. This time the RTL_SDR receiver key is connected to the Raspberry pi. The goal is to access it via the local network. It is used in two steps:

- Running the rtl_tcp server on the Raspberry PI;
- Connection on the Raspberry PI with Sdrsharp software.

Identify the IP address of the Raspberry PI:

#### ifconfig

```
pi@raspberrypi:~ $ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.1.55    netmask 255.255.255.0    broadcast 192.168.1.255
    inet6 fe80::8a7a:b574:ec19:dbce    prefixlen 64    scopeid 0x20<link>
    ether b8:27:eb:52:7f:d4    txqueuelen 1000 (Ethernet)
    RX packets 1055    bytes 146517 (143.0 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 238    bytes 32568 (31.8 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

My RPI IP address is: 192.168.1.55

This command with a "dummy" option allows you to obtain all possible server configurations related to the Rtl-sdr key.

#### rtl_tcp -h

```
pi@raspberrypi:~ $ rtl tcp -h
rtl tcp: invalid option -- 'h'
rtl tcp, an I/Q spectrum server for RTL2832 based DVB-T receivers
Usage:
       [-a listen address]
        [-p listen port (default: 1234)]
        [-f frequency to tune to [Hz]]
        [-g gain (default: 0 for auto)]
        [-s samplerate in Hz (default: 2048000 Hz)]
        [-b number of buffers (default: 15, set by library)]
        [-n max number of linked list buffers to keep (default: 500)]
        [-d device index (default: 0)]
        [-P ppm error (default: 0)]
        [-T enable bias-T on GPIO PIN 0 (works for rtl-sdr.com v3 dongles)]
        [-D enable direct sampling (default: off)]
pi@raspberrypi:~ 💲
```

#### Listening in VHF and UHF

Execute the following command, making sure to replace the IP address of the Raspberry Pi with your own.

rtl tcp -a 192.168.1.55



Run the Sdrsharp software and perform the following 4 steps in order.





Run the following command on the RPI server (direct conversion mode), making sure to replace the Raspberry Pi IP address with your own.

rtl_tcp -a 192.168.1.55 -D





#### F4GOH – KF4GOH

## 10.3.2 Sdr console

Install the Sdr console software described in tutorial 9.2.4, page 9.

Execute Sdr console Or console , then choose RTL Dongle TCP

- 👝 🏦 🗁 🕑 🖲 😲 🖕 🖄 🏷 🔻	SDR Console	v3.0.25			
Home View Receive Transmit Rec/Playback Favour	rites Memorie 🔳 R	adio Definitions		The Part	x
Note: State St		Search 🗸 🖌 Add	Edit Delete		Text viewer
Select Radio	23	Afedri 🕨	Model	Frequency	Serial
		Airspy 🕨	PlutoSDR	0 - 3800 MHz	104473dc59
		ANAN (OpenHPSDR)	T RTL Dongle USB - R820T	50 - 2000 MHz	00000001
Name Model Frequency Serial	Address	bladeRF •			
RTL Dongle USB - R820T RTL Dongle USB - R820T 50 - 2000 MHz 00000001	Realtek::RTI	ELAD •			
		Ettus Research			
		FUNcube Dongles			
		HackRF			
		Hermes-Lite			
		ICOM IC-R8600			
<	•	LimeSDR	Autostart option	5	
		Perseus	Opline help	-	
Bandwidth: 2.048 MHz 🔻		PlutoSDR	<u>Online help</u>		
		REspace •			
		RTI Dongle	тср 3		
D Start	efinitions	PX 666/PX 888	LISB		
		SDP MK1 5 Apdrus			
2s 1s 0s 15 Dicelay 96400	96.600	SDR MK1.5 Andrus	97.000 97.2	-135	
Mode		SoftDark		-150	
Filter 95.000	96.000	SULKOCK	99.000 📖 🗴		
AGC: Off CW Decoder		WINRADIO		<b>▼</b> ×	<
Off Fast Med Slow 🗲 🕼 📈		⇔ Console Streamer			
		⇔ V3 Server			

RTL SDR Definitio	ns		
Model Serial A	Address Port	: Gains	
Add	<b>4</b> Edit	Delete	
RTL SDR Dor rtl_tcp prog	RTL SDR De	finition	dd Definitions
<ul><li>The</li><li>A se</li><li>The</li></ul>	Port: Model:	1234 Default is 1234 RTL Dongle (TCP)	1 device found You have no definitions for RTL Dongle TCP.
The     The RF gains     are leaded b	Serial: Gains: Tuper:	001 6 49.6,48.0,44.5,43.9,43.4,42.1,40.2,38.6,37.2,36.4,33.8,32.8,29.7,28.0,25.4, 8820T E4000 EC0012 EC0013 EC2580 None	Select 'Add' to add this definition to the list.
	8ок	Cancel	Add this definition to the list Annuler

F4GOH	– KF4	IGOH									Tutoria
Select	Radio	-			1	X	Radio	Definitions			×
All	Local	⇔ Server					Q Sea	arch 👻 🛛 Add	Edit Delete		Text viewer
Name		Model	Frequency	Serial	Address	Option	Enable	Name	Model	Frequency	Serial
13	le (TCP)	RTL Dongle (TCP)	0 - 30 MHz	001	192. 168. 1. 55:: 1234	+Gains=•	1	PlutoSDR RTL Dongle (TCP) RTL Dongle USB - R820T	PlutoSDR RTL Dongle (TCP) RTL Dongle USB - R820T	0 - 3800 MHz 0 - 30 MHz 50 - 2000 MHz	104473dc59 001 00000001
Bandwidth	2.048	14 15	Ûs		Defini	itions	Show t Co In 12	mese options	Autostart option Online help	<u>s</u>	, F
IF Display Mode			•	96.4	95.000 9	6.600	Sa	Cancel	]		

Run the following command on the RPI server, making sure to replace the IP address of the Raspberry Pi with your own.

## rtl_tcp -a 192.168.1.55

Click Start to start listening. The procedure is identical for a listening in HF with the option -D

ſ	🚛 🟦 🗁 🕑 🔍 😭 😭 Ŧ		RTL Dor	ngle (TCP) :: SDR Cor	sole v3.0.25			x
	Home View Receive Transı	mit Rec/Playback	Favourites	Memories Tools	Help		Style	- 🔅
	Select Radio     Start     Stop     ♦♦ Bandwidth ▼       M Calibration     Image: Calibration       Image: Calibration     Image: Calibration	F Gain Radio 0.0 •	Previous History	Always Child On Top Instance	Lock Screenshot	Auto-mute:     Noise Blanker:		
	Radio		RX Frequency	Ext	ras	Wideband DSP		
	Receive 👻 🗙	-20 dBm	100 <mark>1</mark> -80 -60 -40	-20		2	-20 dBm	Auto
	KX I 40 kHz	-30 dBm					-30 dBm	
	0.105.499.500	-40 dBm ·····	-88.9				-40 dBm	-15
	Haut-parleurs (Realtek High Definition Audio) 👻	-50 dBm					-50 dBm	-30
	- 4	-60 dBm					-60 dBm	-45
		-70 dBm					-70 dBm	-60
		-80 dBm					-80 dBm	-75
		-90 dBm					-90 dBm	
		-100 dBm	·····		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		····· -100 dBm	-90
		-110 dBm				~~	-110 dBm	-105
		-120 dBm				my man		-120
								-135
	IF Display 🔹	105.450	0	105.500	105.550	105.600		150
	Mode	•	105.400	105.500	105.600	105.700	x2 → 🕑	-150
	AGC: Off	CW Decoder						▼ ×

Install the Sdr console software described in tutorial 9.2.2, page 4.

Download the file ExtIO_RTL_TCP_2020-1.zip



Copy the ExtIO_RTL_TCP.dll file to the HDSDR installation directory.



Then Run the HDSDR program 🛲 HDSDR

#### Select the file ExtIO_RTL_TCP.dll

Choose which External HW should be used	l by Hi	DSDR			x
V Program Files (x86) + HI	DSDR	<b>▼</b> 4 ₂	Rechercher de	ans : HDS	DR 🔎
Organiser 🔻 Nouveau dossier					
<ul> <li>OneDrive</li> </ul>	*	Nom	<u>^</u>		Modifié le
😌 Dropbox		🚳 ExtIO RedPitaya	[RX.dll		21/02/2019
Ribliothèquer		Strio_RTL_TCP.dl	l i		01/11/2020
		Strio_RTL2832.dll			10/10/2020
Images	=				
J Musique					
🛃 Vidéos					
_					
I Ordinateur					
🚰 Disque local (C:)					
💼 temp (E:)	-	•			÷.
Nom du fichier : Extl	O RTI	TCP.dll	External IO HW	/ DLL (Extl	▼ (IIb.* O
			Ouvrir		nnuler
	_				

Stop listening by pressing Stop [F2], then enter the correct IP address in SDR Device [F8]. Once configured press Start [F2].

12:26:36 12:26:37 12:26:39 12:26:40 12:26:41										
12:26:42	ExtIO_RTL_TCP.DLL v2020.1		×	<u> </u>	2		j			
-25 -50	Source IP:Port 192.168.1.55:1234	Tuner RF Gain AGC	Tuner IF Gain AGC	105400	105600	105800	106000	106200		106600  RF -7 dBFS
-100 -125 -150	Autoin: neconnect 3			pi@raspberryp Found 1 devic 0: Realtek	hi:~ \$ rtl_tcp - e(s): ;, RTL2838UHIDIR	-a 192.168.1.55	1			
Peak +20 +40 5 5 5 5 5 5 5 5 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5	2. In Impose Samping mode: [//Q - samping of tuner output R820T/2-Tuner Bandwidth [Automatic v] R820T/2-Tuner Band Center: [DC / Center: 0 v] / Decimation -> Output Rate (*):			Using device Found Rafael [R82XX] PLL n Tuned to 1000 listening Use the devic to receive sa client accept Allocate 8388 >> [ 0.00MB/s	0: Generic RTL2 Micro R820T tum ot locked! 000000 Hz. e argument 'rt1 mples in GRC an ed! 608 bytes for r :] [bytes_in_	<pre>2832U OEM her L_tcp=192.168.1. id control rtl_t ringbuf. flight(cur/max)</pre>	55:1234' in f cp parameter = 256K /	OsmoSDR (gr-osmos s (frequency, gain OK ]	dr) source n,).	
Soundcard [F5] Bandwidth [F6] Options [F7] Full Screen [F11] Start [F2]	√1       Buffer Size:       [64 kB       ▼       Frequency Correction:       0       ∞       ppm	R820T/2 AGC V E4000 Offset RTL DIG AGC V	IF AGC V	<pre>2 bisabled dires Disabled dires set offset tu set freq corr set freq 1054 set gain mode set sample ras set agc mode</pre>	mpling 0 cct sampling mod nning 0 ection 0 90000 : 0 tte 2400000 1	ie				5000 5 dBFS
Exit [F4]	CPU HDSDR: 0%			Wat	erfall () RBV ctrum=	V 5.9 Hz 1	Avg Speed			

HDSDR [default] v2.80	ExtIO_RTL_	TCP.dll@8bit   SRate: 2400000 > 12000	OS: 6.1.7601 SP 1   0	CPU: AMD A6-6420K AP	APU with Radeon HD Graphics   RAM: 7366MB
<u>12</u> :42:25 <u>12</u> :42:26 <u>12</u> :42:27			A.		
12:42:29		后, 10 字 <mark>在</mark> 4 二 月 3 3			
<u>12</u> :42:30			<b>. 1</b>		
12/42/31					
12:42:34					
12:42:35				1 31	
<u>12</u> :42:37					
<u>12</u> :42:38					
<u>12</u> :42:39			11	transis <mark>Seletini</mark> Se	
<u>12</u> :42:40			TOTAL STREET		
<u>12</u> :42:42	100				
<u>12</u> :42:43			A set the set of	in the second	
12:42:44					
<b>4</b> 7020		7030 7040	7050	7060 7	7070 7080 7090 7100 7110 7120 7130
-25		ExtIO_RTL_TCP.DLL v2020.1		X	
-50		Source IP:Port	Tuner RF Gair	n Tuner IF Gain	B [®] pi@raspberrypi: ~
-75		192.168.1.55:1234	HF AGC	IF AGC	worker socket bye Signal caught, exiting!
-100		Autom. ReConnect	V I I	- [ -	comm recv bye
-125		Persistent Connection	▼ = =		Signal caught, exiting!
Peak AN	M ECSS	A/D Sample Rate:			listening
2 ⁹ 10		2.4 Msps	▼ 1 1		Use the device argument 'rtl_tcp=192.168.1.55:1234' in OsmoSDR (gr-osmosdr) source
5	A	Sampling mode:			^CSignal caught, exiting!
3 S-units Tun	ne	pin Q: aliases 0 - 14.4 - 28.8 MHz! (V3)	▼ 1 1		bye!
Volu	ume	R820T/2-Tuner Bandwidth		: :	Found 1 device(s):
S0 -11 dB Gain	n:+19.5d	Automatic	•		0: Realtek, RTL2838UHIDIR, SN: 00000001
SDR-Device [F8]		R820T/2-Tuner Band Center:			Using device 0: Generic RTL2832U OEM
Soundcard [F5]		DC / Center: 0	▼		Found Rafael Micro R820T tuner
Bandwidth [E6]		/ Decimation -> Output Rate (*):			Enabled direct sampling mode, input 2 Enabled direct sampling mode, input 2/Q.
Ontions [F7]		/1	<b>_</b>		Tuned to 100000000 Hz.
Full Screen [F11]	NR N	Buffer Size:		_	Use the device argument 'rtl tcp=192.168.1.55:1234' in OsmoSDR (gr-osmosdr) source
Mu			D020T/2 ACC 2	IF AGC 🔽	to receive samples in GRC and control rtl tcp parameters (frequency, gain,).
	lute A	64 kB	<ul> <li>Nozu1/2 Add V</li> </ul>		
Start [F2]	lute A	64 kB Frequency Correction:	E4000 Offset	Tune USB 🕅	client accepted! Allocate 8388608 bytes for ringbuf.
Start [F2] Minimize [F3] 01/	lute A /11/20	64 kB Frequency Correction:	E4000 Offset	Tune USB 🕅	client accepted! Allocate 8388608 bytes for ringbuf.
Start [F2] Minimize [F3] 01/ Exit [F4]	lute A	64 kB Frequency Correction: 0 > ppm CPU Total: 9%	E4000 Offset	Tune USB	client accepted! Allocate 838600 bytes for ringbuf.

## 10.3.4 Sdruno

Install the Sdruno software described in Tutorial 9.2.5, page 12.

Download the file ExtIO_RTL_TCP_2020-1.zip

Copy the file ExtIO RTL TCP.dll to the Documents directory



Execute the SDRuno (Extio) file, installed on the hard disk. (Search when you don't know where the program was installed). Note that there is a manual in pdf (SDRuno User manual) and it is the only manual installed with the program among the 4 softwares presented here.

#### ≝⇔ SDRuno (EXTIO)

- Reset SDRuno Registry Settings
- ≝⊶ SDRuno
- 🕵 SDRuno User Manual
- 🕬 Uninstall SDRuno

Check that the  $ExtIO_RTL_TCP.dll$  file is correctly taken into account so that the software can access the rtl-sdr key.

	ExtIO should be used by Studio 1		×
Regarder dans :	Mes documents	← 🗈 💣 📰▼	
C 1	Nom	Modifié le	Туре 🖍
Emplacemente	SYNTHESE PROJET BALLON	26/05/2018 07:03	Dossier (
récents	길 temp	14/09/2017 17:48	Dossier (
	🐌 TmForever	28/04/2018 18:11	Dossier (
	퉬 upload sans compil	06/04/2018 19:56	Dossier (
Bureau	길 VirtualDJ	16/04/2020 21:15	Dossier (
-	길 xml	11/09/2019 19:47	Dossier (
	Ja Zoom	30/08/2020 17:10	Dossier (
Bibliothèques	길 zoom_arrl	28/08/2020 11:54	Dossier (
	Downloads	30/09/2018 11:53	Raccour
	S ExtIO_RTL_TCP.dll	01/11/2020 12:19	Extensio
	SttIO_RTL2832.dll	04/10/2020 17:10	Extensio ≡
Ordinateur	ExtIO_RTLSDR_u8.dll	11/10/2020 11:46	Extensio
	< [		
Réseau	Nom du fichier : ExtIO_RTL_TCP.dll	<b>▼</b> (	Duvrir
	Types de fichiers : External IO HW driver (DLL)	▼ A	nnuler



Change the IP address, making sure to use yours.

ExtIO_RTL_TCP.DLL v2020.1		x
Source IP:Port 192.168.1.55 1234	Tuner RF Gain AGC	Tuner IF Gain AGC
Autom. ReConnect	• :[:	- [ -
Persistent Connection	: E	
A/D Sample Rate: 2.304 Msps (192.0 kHz)		
Sampling mode:		
R820T/2-Tuner Bandwidth Automatic		: :
R820T/2-Tuner Band Center:		
/ Decimation -> Output Rate (*):		- T
Buffer Size:		- 1 -
64 kB	R820T/2 AGC 🔽	IF AGC 🔽
Frequency Correction:	E4000 Offset 🗖 RTL DIG AGC 🔽	Tune USB 🗖



To date I have not been able to use rtl_tcp with SDRuno in HF reception (direct sampling mode).

#### F4GOH – KF4GOH **10.4 Installing the SPY Server**

<u>Spyserver</u> works a little bit like rtl_tcp, but with the addition of the ability to share your listening station. This one appears on the <u>world map</u>. All you have to do is copy the IP address and port into your favorite SDR software and listen to it.



With the Putty utility, type these commands in the following order:





Unzip the file, then edit the configuration file spyserver.config

#### tar xvzf spyserver.tgz

#### ls

nano spyserver.config

```
pi@raspberrypi:~/spyserver $ tar xvzf spyserver.tgz
spyserver
spyserver_ping
spyserver.config
pi@raspberrypi:~/spyserver $ ls
spyserver spyserver.config spyserver_ping spyserver.tgz
pi@raspberrypi:~/spyserver $ nano spyserver.config
```

Configure your server using the example below:

# SPY Server Configuration File	# AirspyHF+	# Initial Center Frequency
# TCD Listener	# RIL-SDR # Auto (Scope for the first evolution	initial fraguency 7100000
# TCP Listener	# Auto (Scans for the first available	Initial_frequency = 7100000
bind bost $-102168155$	device)	# Minimum Tunable Frequency
$bind_{10} = 192.100.1.35$	dovico tupo - PTL SDP	# Commont if using the device default
$bind_point = 3555-6666$	device_type = KTE-SDK	
# List Server in Airsov Directory	# Device Serial Number as 64bit Hex	#minimum frequency = 0
	# For example: 0xDD52D95C904534AD	"minimum_noquonoy = o
list in directory = 1	# A value of 0 will acquire the first	# Maximum Tunable Frequency
<u>.</u>	available device.	# Comment if using the device default
# Owner Name	#	3
# For example: John Doe L8ZEE	device_serial = 0	#maximum_frequency = 35000000
owner_name = <mark>f4goh</mark>		
	# Device Sample Rate	# Frequency Correction in PPB
# Owner email	# Possible Values:	#
# For example: john@doe.com	# Airspy R0, R2 : 10000000 or 2500000	<pre>#frequency_correction_ppb = 0</pre>
owner_email =f4goh@orange.fr	# Airspy Mini : 6000000 or 3000000	
	# Airspy HF+ : 768000	# Initial Gain
# Antenna	# RTL-SDR : 500000 to 3200000	#
# For example: Random Wire/Magnetic	# Comment to use the device's default	#initial_gain = 5
Loop/Mini-Whip/Inverted V/etc.	" I I I I I I I I I I I I I I I I I I I	
antenna_type =dipole	#device_sample_rate = 2500000	# RIL-SDR Sampling mode
		# Quadrature = 0,
# Antenna Location	# Force 8bit Compression Mode	# Direct Sampling   Branch = 1
# For example: 48.858332, 2.294560	# The 8bit Compression mode has proven	# Direct Sampling Q Branch = 2
antenna_location = $47.89,0.27$	sufficiently good for most streaming use	nt_sampling_mode = 2
# General Description	uses. # Use it to same some internet handwidth	# Converter Offset
	# Ose it to same some internet bandwidth.	# Set to $-12000000$ to enable the
general description = test rx	#force 8bit = 1	Sny/erter offset
		#converter offset = -12000000
# User sessions	# Maximum Bandwidth	
	# Limits the maximum IQ bandwidth the	# Bias-Tee
maximum clients = 1	clients can set	# For AirspyOne only - Useful for LNA's
_	# Recommended value for WFM is	and SpyVerter
# Maximum session duration	200000	<pre>#enable_bias_tee = 0</pre>
# In minutes. 0 for no limit	# Recommended value for narrow band	
	modes is 15000	# Buffer Size (in milliseconds)
<pre>#maximum_session_duration = 30</pre>	#	
	#maximum_bandwidth = 15000	buffer_size_ms = 50
# Allow clients to retune and change of		
gain of the device	# FFT Frames Per Second	# Buffer Count
#	$III_IPS = 15$	huffer count 10
allow_control = 1	# FFI BINS	$puner_count = 10$
	$\#$ DINS = 2''IIT_DIN_DITS	
# Device Type # Dessible Values:	fft hip hits - 16	
# 1 USSIDIE Values. # $AirsnyOne (R0 R2 Mini)$	$\Pi_0\Pi_0\Pi_0 = \Pi_0$	
# AirspyOne (R0, R2, Mini)		

RPI part 10-V1.0.docx

In the configuration example rtl_sampling_mode = 2 for HF listening. For VHF/UHF listening, just add the # character to comment the line. (#rtl_sampling_mode = 2).

Run the server.

./spyserver

pi@raspberrypi:~/spyserver \$ ./spyserver SPY Server v2.0.1700 Copyright (C) 2016-2018 Youssef Touil - https://airspy.com Reading the configuration file: spyserver.config Listening for connections on 192.168.1.55:555 Found Rafael Micro R820T tuner [R82XX] PLL not locked! Enabled direct sampling mode, input 2 Accepted client 192.168.1.13:26511 running SDR# v1.0.0.1765 on Microsoft Windows NT 6.1.7601 Service Pack 1 Device was sleeping. Wake up! Found Rafael Micro R820T tuner [R82XX] PLL not locked! Enabled direct sampling mode, input 2 Acquired an RTL-SDR device

## 10.5 Test with 2 client softwares

## 10.5.1 Sdrsharp



Run SDRSharp.exe, then configure the source (Spy Server Network) and IP address

In this configuration the listening is on the local network. To be able to access from the Internet it is necessary to configure the ADSL BOX.

#### 10.5.2 Sdr console

#### Same principle as in 10.3.2, but with SPY Server.



The configuration is identical to the tutorial 6.8: Accessing the web SDR from outside the QRA.

The difference is in the port number (5555).

Retour	Rés	eau							
DHCP	NAT/PAT	DNS	UPnP	DynDNS	DMZ	NTP	IPv6		
spyserve	spyserver         5555         555         TCP         raspberrypi-2         Créer           ex. : 1000         ex. : 1000-2000         ex. : 1000-2000								
Activer	Applicatio	n/Service	e Port	interne	Port exter	ne	Protocole	Équipement	
$\checkmark$	spys	erver	ŧ	5555	5555		TCP	raspberrypi-2	Ê

On the <u>world map</u>, my station appears, the "ready" icon is in green, it is possible to access my station by copying the IP address and the port :



## **10.7 Conclusion**

SDR reception sharing is very easy to achieve with a Raspberry pi. This will be able to render many services in various test situations. I thank Ladislav **OK1UNL** for giving me the idea of this tutorial. Linux users will be able to use <u>GQRX</u> as a client for the server.



# Raspberry Pi for HAM Radio Part 11



## Summary:

## Part 11: Remote station with HamVoIP

Reminder: Raspberry Pi = RPI

Prerequisite: Part 8: image disk creation on mSd card.

11.1 Server/client set Presentation	P. 2
11.2 VoIP protocols and software	P. 3
11.3 Making the interface	P. 3
11.4 Creating the disk image	P. 6
11.5 Basic Setup	P. 6
11.6 TRX Settings	P. 11
11.7 Advanced configuration	P. 12
11.8 Using iaxRpt on Windows	P. 12
11.9 Using DVSwitch mobile for smartphone	P. 14
11.10 Configuration overview	P 15
11.11 Conclusion	P 15

Version du 9/5/2021 V1.0 on RPI4

#### **11.1 Server/client set Presentation**

The objective is to be able to perform a remote QSO with a classic mobile TRX located at the QRA via a local network or the Internet in a private setting. This low-cost solution only requires a modified sound card located between the Rapsberry Pi and the TRX and the pre-installed HAMVOIP Asterisk Allstar software suite. The connection with the server will be done with a PC or a smartphone.



However, you should remember to switch on the TRX and RPI before leaving the station. It is not possible to change the frequency remotely. (Especially on a mobile TRX!).

For OMs who want to chain QSOs in HF (voice or digital), I recommend the <u>https://doc.webradiocontrol.tech/</u> software, which has to be paid for, but which offers many possibilities with a very good man-machine interface (Possibility of testing over a period of 15 days).

#### **11.2 VoIP protocols and software**

VoIP stands for Voice over IP. VoIP is a computer technology that allows voice to be transmitted over IP-enabled networks, via the Internet or private networks.

There are several protocols that support VoIP, including:

- SIP : Session Initiation Protocol,
- IAX : Inter-Asterisk_eXchange

It is the second protocol that we use in our remote station case because HAMVOIP uses <u>Asterisk</u> open source software for Linux.

Note :

The client software installed on the PC is called iaxRpt and has the same name as the protocol.

## **11.3 Making the interface**

The connection between the TRX and the interface is made using the mini DIN 6 pin. The pins used are 1, 2, 3, 5 and 6. A mini DIN 6 female connector for printed circuit boards can be used as shown in the print on the right.

Broches de terminal de données :

6 5	N°	Nom	I/O	Fonction	
	1	PKD	Entrée	Signal audio pour transmission par paquets	4 6
	2	DE	_	Mise à la terre de la borne PKD	
	3	PKS	Entrée	'L' est transmis et le microphone est en sourdine	2
	4	PR9	Sortie	Signal de répétition de 9600 (bps)	BH2
Kenwood	5	PR1	Sortie	Signal de répétition de 1200 (bps)	
	6	SQC	Sortie	Signal de contrôle du silencieux; Fermé : H, Ouvert : L (Les réglages par défaut peuvent être modifiés dans Menu 520)	3 5
		E	_	Mise à la terre commune	RH1

## Yaesu

## Vue de dessous

Go	up	ille	Étiquette	Note	Couleur du fil CT-39
	1		PKD (Données d'entrée)	Données d'entrée Packet <i>Impédance :</i> 10 Ohm-k <i>Niveau d'entrée maximum :</i> 40 pp mV pour 1200 bps 2,0 V pp pour 9600 bps	Marron
	2		GND	Signal de terre	Rouge
	3		PTT	Terrain à transmission	Orange
	4		RX9600	Données de sortie Packet de 9600 bps <i>Impédance :</i> 10 Ohm-k, <i>Sortie maximale :</i> 500 mV pp	Jaune
	5	1	RX1200	Données de sortie Packet de 1200 bps Impédance : 10 Ohm-k Sortie maximale : 300 mV pp	Vert
	6		PSK (SQL)	Contrôle du silencieux Silencieux ouvert : +5 V, Silencieux fermé : 0 V	Bleu



The Yaesu FT7900 documentation is much clearer than the Kenwood TM-V71.



Before modifying the USB sound card, it is recommended that you test it on a PC. To do this, use headphones on the green output while listening to music, for example.

Sound card before modification:



#### Sound card after modification :





#### - Start by unsoldering the 2 3.5 jack connectors



Follow the modification of the "sound card" from the blog at the following address **Tip**: Preset the potentiometer to halfway before implementation. https://www.marrold.co.uk/2018/04/converting-cm108-usb-fob-for-amateur.html



Finish by connecting the wires to the 6-pin mini din connector

#### **11.4 Creating the disk image**

Download the disk image (green box) using this link https://hamvoip.org/#download

 RPi2-3-4 includes Pi 2,3B,3B+,3A+,and 4B Image Version 1.6-14 - Self Extracting exe for Windows (LATEST)Be sure to update when setting up! -RPi2/RPi2-3-4 V1.6-14 Allstar.exe

IMPORTANT - Download this README for the V1.6 version

RPi2-3-4 includes Pi 2.3B+.3A+.and 4B Image Version 1.6-14 - xz archive (LATEST) Be sure to update when setting up! RPi2/RPi2-3-4_V1.6-14_Allstar.img.xz

IMPORTANT - Download this README for the V1.6 version

 BBB Image (Final version) NOT RECOMMENDED FOR NEW INSTALLS! -BBB/BBB_Allstar_V1.2.2.img.zip

Download and install the Etcher utility to copy the image to an MSD card <u>https://www.balena.io/etcher/</u>

Flash OS images to	Flash OS images to SD cards & USB drives, safely and easily.		
<b>F</b> Select image			
Down	load for Windows (x86 x64)	·	

Select the RPi2-3-4_Vx.x-x_Allstar.img.xz file, the SD card reader, and then click on Flash. Same procedure as in tutorial 8.

## 11.5 Basic Setup

There is no need to use a monitor on the Raspberry PI (RPI), in fact all the configuration can be done remotely with Putty as explained in tutorial 1.

Insert the microSd card into the RPI and the sound card. Turn on the RPI. Do not forget the network cable.

Start the command prompt ^{Implice de commandes} and then with the ping alarmpi command, perform a connectivity test between the PC and the Raspberry PI as shown in the following screenshot.

C:\Users\anthony>ping alarmpi Envoi d'une requête 'ping' sur alarmpi.home [192.168.1.24] av 192.168.1.24 192.168.1.24 192.168.1.24 nées : octets=32 temps<1ms TTL=64 Réponse de octets=32 octets=32 octets=32 octets=32 Réponse de temps<1ms TTL=64 temps<1ms ponse de temps<1ms TTL=64 Réponse de 192.168.1.24 Statistiques Ping pour 192.168.1.24: Paquets : envoyés = 4, reçus = 4, perdus = 0 Durée approximative des boucles en millisecondes Minimum = Oms, Maximum = Oms, Moyenne = Oms perdus = 0 (perte 0%)

#### F4GOH – KF4GOH

Configure <u>Putty</u> as follows before connecting to the RPI via ssh. (Don't forget to save the session, so you don't have to do this configuration work again)

😵 PuTTY Configuration	<u>ି ସ</u> ୍ଥ	Reputty Configuration	<u>१</u> ×
Category:		Category:	
Session     Logging     Terminal     Keyboard     Bel     Features     Window     Appearance     Behaviour     Translation     Selection     Colours     Connection     Data     Proxy     Telnet     Rlogin     SSH     SSH     Serial	Options controlling the effects of keys         Change the sequences sent by:         The Backspace key         Control-H	Session     Logging     Terminal     Keyboard     Bell     Features     Service     Selection     Colours     Connection     Proxy     Telnet     Rlogin     Serial	Enabling and disabling advanced terminal features
About Help	Open Cancel	About Help	Open Cancel
Category: Session Logging Terminal Keyboard Bell Features Window Appearance Behaviour Colours Connection Connection Proxy Telnet Rlogin SSH Serial	Options controlling character set translation Character set translation Remote character set: ISO-8859-1:1998 (Latin-1, West Europe) (Codepages supported by Windows but not listed here such as CP866 on many systems, can be entered manually) Treat CJK ambiguous characters as wide Caps Lock acts as Cyrillic switch Adjust how PuTTY handles line drawing characters Handling of line drawing characters: Use Unicode line drawing code points Poor man's line drawing (+, - and I) Font has XWindows encoding Use font in Doth ANSI and OEM modes Use font in OEM mode only Copy and paste line drawing characters as lqqqk	Category: Session 	Basic options for your PuTTY session Specify the destination you want to connect to 9 Host Name (or IP address) alampi 8 222 Connection type: Raw Telnet Rlogin SSH Serial Load, save or delete a stored session Saved Sessions alampi 11 Default Settings elampi 22 Load Save 12 Delete Close window on exit: Always Never Only on clean exit
About Help	Open Cancel	About Help	p 13 Open Cancel

Then enter the login root and password root



Tutoriel

The configuration starts automatically. Follow the screenshots below:

Perform System Update Retrieve the latest system updates? Do you want to do this now? Yes >       < No >         PuTTY Fatal Error       X         Server unexpectedly closed network connection       OK	System has been updated The system has been updated and will now reboot to apply changes! After the update and reboot you will need to reconnect with Putty. 192.168.1.24 - PuTTY login as: root root@192.168.1.24's password:
Perform System Update Retrieve the latest system updates? Do you want to do this now? < Yes > < No >	First Time Script Would you like to run first setup now
Enter a new root password	<pre>Private Node Check If you have a node number and password assignment from Allstarlink.org you should answer 'NO' to this question. If you intend to use Allstar in a strictly private network such as a repeater link or commercial use then answer 'YES'. Private nodes have self assigned node numbers of less than 2000, are not registered with Allstar and do not require a password. Private nodes require manual routing in the nodes stanza of rpt.conf. Most users would answer 'No' to this question. Is this a private node? </pre>
Private Node Input Enter private node number:	Set Node Configuration Set Node Configuration Do you want to setup your node configuration for asterisk
Node Configuration Node configuration will be run after reboot.	Time Zone Configuration Time Zone Configuration The current time zone is set to: America/New_York A correct time zone entry will allow the system clock to report the correct time. Do you want to change the default time zone? Vo >
Use the scroll keys to move faster, then validate space bar before pressing the enter key.	the country with the







## The main menu of the application should appear, go to menu 12

🕑 192.168.1.24 - PuTTY	192168.1.24 - PuTTY
Admin Menu List for: alarmpi (192.168.1.24)	12 Run simpleusb-tune-menu Application
2 Change the ROOT password	Active simpleusb device stanza: [usb]
3 Change the primary NODE number 4 Change the system Timezone	<ul> <li>View COS, CTCSS and PTT Telemetry using real-time display</li> <li>P: For the second secon</li></ul>
5 Change the system Hostname 6 Configure the Wired Ethernet Networking	<ul> <li>3) Set Transmit A Level 4) Set Transmit B Level</li> </ul>
7 Configure the WiFi Interface Networking 8 Change the Secure Shell (SSN) port	5) Set Tx Audio Level Method (currently LOG) 7) Set Transmit DSP Level
9 Start Bash shell interface	<ul><li>B) Toggle RX Boost Mode (currently Enabled)</li><li>C) Toggle Echo Mode (currently Disabled)</li></ul>
10 Display System Version Numbers 11 Run Asterisk CLI client	D) Flash (Toggle PTT and Tone output several times)
12 Run simpleusb-tune-menu Application 13 Restart Asterisk Server	K) Manually key COS (currently Unkeyed)
14 Power-cycle the USB sub-system 15 Reboot this system	G) Toggle DE-emphasis Mode (currently Disabled)
16 Perform system power down	<ul> <li>A) loggle PLTITER Mode (currently Enabled)</li> <li>Q) Toggle DCSfilter Mode (currently Disabled)</li> </ul>
Pup Selected Item	<ul><li>I) Toggle PTT Mode (currently active LOW)</li><li>J) Change COSFROM Mode (currently "usbinvert")</li></ul>
	L) Change CTCSSFROM Mode (currently "no") M) Change RXONDELAY value (currently "0")
	N) Change RXAUDIODELAY value (currently "0")
	0) Exit Menu
	Please enter your selection now:
Мерц 2.	Please enter your selection now: 2
Change the sound lovel (100) of the recention	RX VOICE DISPLAY: v 3KHz v 5KHz
Change the sound level (100) of the reception.	>   Current setting on By Channel is 500
	Enter new value (0-999, or CR for none): 100
	Changed setting on RX Channel to 100 RX VOICE DISPLAY:
	v 3KHz v 5KHz
	Current setting on Rx Channel is 100
	Rx voice setting not changed
Menu 3 :	Please enter your selection now: 3
As well as transmission (100)	Current setting on Tx Channel A is 500
	Changed setting on TX Channel A to 100
Manu Li	Please enter your selection now: i
Change COSFROM mode to 2 [usb]	Please select from the following telemetry methods:
	2) [usb]
	3) [usbinvert] (currently selected)
	4) [pp] 5) [npinvert]
	Press <enter> to exit with no change</enter>
	Enter make your selection now: 2
The <b>P</b> menu provides an overview of the configu	Iration Please enter your selection now: p USB device String: 1-1.3:1.0
	Cardie 0
	Name is: usb
	Rx Level: 100 Rx ondelay: 0
	Rx audio-delay: 0
	Tx B Level: 500
	Tx DSP Level: 999 preemphasis: no
	deemphasis: no
	dcsfilter: no
	rxboost: yes
	PTT: Active LOW
	CICSS (input): Ignored COS (input): CM108/CM119 Active HIGH
	COS (test): Un-Keyed COS (composite): Un-Keyed
Plasse enter your selection news w	
reade enter your serection now, v	The v menu gives an overview of the
	status of the COS and PTT signals.
Press <enter> to exit from this feature.</enter>	Very useful menu for detecting a failure.
REALTIME RX TELEMETRY DISPLAY:	
COS   COS   COS   CTCSS   CTCSS   PT	T
(composite)   (input)   (test)   (input)   (override)	20.0
CLEAR   CLEAR   IGNORE   CLEAR   CLE	.AK

Finish by saving the configuration (key <b>w</b> )	<pre>Please enter your selection now: w Saved updated simpleusb.conf node stanza to: /tmp/simpleusb_usb.conf Merged changed in: /tmp/simpleusb_usb.conf with: /etc/asterisk/simpleusb.conf Saved radio tuning settings to simpleusb_tune_usb.conf Press <enter> to continue.</enter></pre>	
Exit the menu (zero key: <b>0</b> )	0) Exit Menu Please enter your selection now:	

## 11.7 Advanced configuration

For command line configuration specialists, it is possible to do manual configuration in the 9 Start bash shell interface



The 3 configuration files are :

- rpt.conf
- iax.conf
- extensions.conf

https://wiki.allstarlink.org/wiki/Main_Page

The problem is that the official documentation is complete but confusing, mixed with obsolete screenshots rather like 1000 post-it notes on a desktop.

The following is the default configuration using the "node" number **1998** and the password "iaxrpt" **1234**.

## 11.8 Using iaxRpt on Windows

Download the iaxRpt utility (green box) using the link below:	Setup/Download IAXRpt
https://wiki.allstarlink.org/wiki/Setup/Download_IAXRpt	IAXRPT is a specialized Windows "soft phone" program which allows users to connect from their PC's to an AllStarLink node. Setting up IAXRPT access is similar to setting up dial-in access, but a different command line switch is used in extensions.conf, and user authorization is done in lax.conf. Contents [hide] 1 Download 1.1 Security Issues 2 Modifying iax.conf 3 IAXRpt Usage
	Download Setup file for IAXRPT This was at Xeletec Ø, but their servers are offline as of 2019-04-04.



#### F4GOH – KF4GOH

Once the software is installed, perform the following configuration by adjusting the IP address of the RPI, and then check the sound configuration of the PC provided that the headset and microphone are properly connected.

Image: Accounts       Image: Accounts         Image: Accounts       Image: Accounts	iaxRpt       Image: Control of the second seco
Operation: 1 Select "<1998> remote trx" from the drop-down menu; 2 Click on "connect"; 3 Click on "transmit" to go to transmit; Click on "disconnect" to leave the connection;	iaxRpt     File View Options Keyboard Help     MIC     SPK     Call State   Connected To     Call State     Connect     Scan Start     Speaker   Disconnect     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I

Adjust the sound levels with a screwdriver on the adjustable potentiometer if necessary as explained on page 11 (menu 2) to remove any sound saturation.

Please enter your selection now: 2		72
RX VOICE DISPLAY: v 3KHz v 5KHz	-	
[]=====>	j	IN P



## **11.9 Using DVSwitch mobile for smartphone**

Install DVSwitch Mobile, then go to the Account menu. Select the 1st line. Fill in the fields as shown in the example by adapting the IP address of the RPI. Do not forget to lower the Transmit Level <a href="https://play.google.com/store/apps/details?id=org.dvswitch&hl=fr&gl=US">https://play.google.com/store/apps/details?id=org.dvswitch&hl=fr&gl=US</a>



It is possible to use the Zoiper client software, but this does not have a PTT command.

#### **11.10 Configuration overview**

File extensions.conf					
Configuration for access with iaxRpt on PC					
[ <i>radio-iaxrpt</i> ] exten=1998,1,Rpt,1998 X exten=1999,1,Rpt,1999 X					
Configuration for access with DVSwitch Mobile on Smartphone					
<pre>[phone-iaxrpt] exten =&gt; 1998,1,Answer exten =&gt; 1998,n,Playback,rpt/node</pre>					
<pre>exten =&gt; 1998,n,Playback,digits/1 exten =&gt; 1998,n,Playback,digits/9 exten =&gt; 1998,n,Playback,digits/9 exten =&gt; 1998,n,Playback,digits/8 exten =&gt; 1998,n,Set(CALLERID(num)=0) exten =&gt; 1998,n,Rpt,1998 P \${CALLERID(name)} ;;; The "CallerID" from IAXRpt</pre>					

Note the links between the two configuration files as well as the password 1234 and the "node" **1998**. There is a difference in configuration between using Windows and Smartphone.

## **11.11 Conclusion**

Once you have all the elements in hand, the basic configuration is fairly easy to do, but you shouldn't really rely on the official documentation. Fortunately, there are many examples on Youtube illustrating "bits" of configuration on both the server and the client.

In any case, the investment remains minimal with the sound USB key. Of course, you need a Raspberry PI and a TRX with the COS output that is essential for this project.

HamVoIP is an interesting project that avoids investing in expensive and licensed hardware. It is also possible to create an <u>allstarlink</u> account allowing other OMs to use your access point (this is not developed here).

The modified key will be used in another APRS tutorial soon. So this little interface can be used more.

73 and good remote.



# Remote Station with an SDR receiver Part 12



## Sommaire :

## Partie 12 : Remote Station with an SDR receiver

Reminder: Raspberry Pi = RPI

Prerequisite: Part 8: image disk creation on mSd card.

12.1 Server/client set Presentation	P. 2
12.2 Creating the disk image	P. 2
12.3 Basic Setup	P. 3
12.4 Basic configuration	P. 4
12.5 Ssh connexion	P. 6
12.6 Conclusion	P. 7

Version 15/9/2021 V1.0 on RPI4

#### 12.1 Server/client set Presentation

The goal is to be able to use an SDR key remotely using a WEB browser. Using the Chrome browser (mandatory), the user accesses the Raspberry PI on their local network to which the RTL-SDR key is connected.

Note that it is possible to use with the same environment an Adalm-Pluto or a HackRF and thus use the transmission part which differs from the openwebRX project (tutorial 6.)

The software was produced by f1atb. His work is remarkable. The interface is user-friendly and intuitive.

#### https://f1atb.fr

Example of configuration with a PC on a local network (f1atb image). Only the use of the RTL-SDR key is explained in this document.



## 12.2 Creating the disk image

Download the disk image (framed in red) using this link

## https://github.com/F1ATB/Remote-SDR/releases



Tutoriel

Use <u>7-zip</u> software to decompress the image

Lien	Туре	Windows	Taille
<u>Téléchargez</u>	.exe	32 bits x86	1,2 Mo
<u>Téléchargez</u>	.exe	64 bits x64	1,4 Mo

Download and install the Etcher utility to copy the image to an mSD card

#### https://www.balena.io/etcher/

Flash OS images to SD cards & USB drives, safely and easily.				
<b>F</b> Select image				
Dow	nload for Windows (x86 x64)	·		

Select the remsdr_v2.4_rpi4.img file, the mSD card reader, then click on Flash. Same procedure as tutorial 8.

#### 12.3 Basic Setup

Identify the IP address of your Raspberry PI.

The procedure is explained in tutorial 1 chapter 5 page 7.

Install if you haven't already done so, the mandatory Chrome browser.

Then enter the IP address of the Raspberry PI in the URL bar, in my case 192.168.1.32


### 12.4 Basic configuration

There is virtually nothing to configure. You will still have to check if the RTL-SDR key is properly connected to the Raspberry PI.

Click on Tools



Then check the detection of the RTL-SDR key as indicated below in red.



Return to the main menu (penguin icon at the top right)

### F4GOH – KF4GOH Click on Remote SDR

← → C ▲ Non sécurisé | 192.168.1.32



Check the parameter selection for the RTL-SDR key. The IP address must match the Raspberry PI.

$\leftarrow \   \rightarrow \   G$	A Non sécurisé   19	2.168.1.32/remote_so	dr.html				🖻 🖈 🌒 😫 E
🖧 🖸 📕	RX Gains	Log	SDR RX	(On● <b>Re</b>	mote SDR	SDR TX On 🔍	TX Gains Parameters
Audio In	Audio Play   Spectra 4 β β 3	-4 -2 1	) 2 4kHz	Parameters SDR type Pluto Pluto HackRF / RTL-SDR	x 32 Hz 0000	TX 1000	145100 000 Hz TX->RX RX->TX
			RX Armigration	RX SDR IP: <mark>192.168.1.32</mark>	an. correct: Auto correction 0 Hz • • • • • • • • • • • • • • • • • •	Select frequency	Manual Correct. 0 Hz /band 2M V Relays: V Auto:
105 498		Store	12.2	ex: 192.168.0.120 TX SDR IP: ^{Fort: 80, 8004,8005} Left blank if no TX SDR	ume RX Audio TX state Filter200 - 2600 Hz	TX Audio Off	<ul> <li>Micro</li> <li>Sinus 800 Hz</li> <li>Sinus 500 Hz et 1900 Hz</li> <li>Volume 0 dB</li> <li>Manuel</li> <li>Auto 1</li> <li>Auto 2</li> </ul>



Test the reception of the RTL-SDR key using a broadcast FM station as usual.

← → C ▲ Non sécurisé   192.168.1.32/remote_sdr.html				🔤 🚖 🏉 🌲 😩 🗄
🖧 🖸 🛛 RX Gains 🛛 Log	SDR RX On •	Remote SDR	SDR TX (	On 🍯 TX Gains Parameters 🔲
Autor 2 RX Gains X Gain RF 7.5 dB	RX Central Freq.:	105 500 119 Hz 105 000 kHz Bandwidth:	2 MHz 000	145 100 000 Hz X->RX RX->TX
Gain IF 20 dB	Audio FFT SDR Freq.: 105 000 000 Hz HF band: 2M	Freq. Offset: Man. correct.: 0 Hz 0 Hz USB • USB • AM • NBFN	Auto correction	Manual Correct. o Hz ct frequency band 2M V Relays V Auto
144 300 SSB Call	RX Audio On	Volume RX Audi RX state Audio Filter200 - 260	o TX state X0 Hz Off	Micro
	Average	n a sea a define pour a constant de la constant de sea	-5	
,	111 111 111 111 111 111 111 111 00 104500 104600 104700		105200 105300 105400 10550	11111111111111111111111111111111111111

1 - activate reception,

- 2 Adjust the gain on reception,
- 3 Select WBFM and adjust the listening frequency. Increase the bandwidth to 2 MHz,
- 4 Adjust the volume,
- 5/6 Adjust the levels to correctly view the stations.

All you have to do is click in the waterfall to listen to the selected station.

## 12.5 Ssh connexion

To access the Raspberry PI in ssh with putty (tutorial 1 page 10), enter the following login and password:



I disabled the desktop environment when starting the Raspberry PI.

#### Tutoriel

### sudo raspi-config

pi@rasp-rem-sdr:~ \$ sudo raspi-config pi@rasp-rem-sdr:~ \$ <mark>-</mark>



## 12.6 Conclusion

Bravo André (F1ATB) for this magnificent achievement. The graphical interface is very ergonomic and will delight OMs wishing to control their station remotely.

73 and good remote.



# Universal HamRadio Remote Part 13



Summary :

## Part 13 : Universal HamRadio Remote

Prerequisite: Part 4: Using the Raspbian Lite operating system without a graphical interface.

13.1 Server/client set Presentation	P. 2
13.2 Installation	P. 2
13.3 Basic Setup	P. 9
13.4 Conclusion	P. 11

This document contains the information at the following link with screenshots.

https://github.com/F4HTB/Universal_HamRadio_Remote_HTML5/wiki

Version du 30/10/2021 V1.0 sur RPI4

### **13.1 Server/client set Presentation**

The goal is to be able to use a transceiver remotely using a WEB browser.

Using the Firefox browser (for example), the user accesses the Raspberry PI on their local network to which the transceiver is connected.

Note that it is possible to use with the same environment, the transceivers supported by the <u>Hamlib</u> library, (which is considerable).

The software was produced by <u>F4HTB</u>. The interface is user-friendly and intuitive.

Example of a configuration with a PC on a local network with an IC7300. The operator will be able to traffic remotely by voice with a PC connected to his local network. The Raspberry PI is used as a WEB server.



## **13.2 Installation**

F4HTB does not offer a ready-made disc image. You will have to install the software manually.

Start by loading the Raspbian Lite operating system without a graphical interface onto an mSD card, as shown in tutorial 4 or using the F4HTB guide.

https://github.com/F4HTB/Universal_HamRadio_Remote_HTML5/wiki/Example-of-complete-installation

Once the image with the Raspbian Lite operating system is created, add the empty "ssh" file without extension in the root of the mSD card named boot.

This directly activates the ssh connection without going through the raspi-config menu explained in tutorial 4.



Update the operating system

sudo apt-get update && sudo apt-get upgrade -y && sudo reboot

Allow 15 minutes to wait.

After restarting, reconnect in ssh with putty.

Install the Python 3 environment and its dependencies

# sudo apt-get install -y git python3 python3-pip python3-numpy python3-tornado python3-serial python3-pyaudio rtl-sdr

pi@raspberrypi:~ \$ sudo apt-get install -y git python3 python3-pip python3-numpy python3-tornado python3-serial python3-pyaudio rtl-sdr
Reading package fists Done
Building dependency tree
Reading state information Done
python3 is already the newest version (3.7.3-1).
python3 set to manually installed.
The following package was automatically installed and is no longer required:
python-colorzero
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
dh-python gir1.2-glib-2.0 git-man libblas3 libcurl3-gnutls liberror-perl
libexpat1-dev libgfortran5 libgirepository-1.0-1 libjack-jackd2-0 liblapack3
libopus0 libportaudio2 libpython3-dev libpython3.7-dev librtlsdr0
python-pip-whl python3-asnlcrypto python3-cffi-backend python3-crypto
python3-cryptography python3-dbus python3-dev python3-distutils

sudo pip3 install pyalsaaudio pam pyrtlsdr



sudo apt-get autoremove -y --purge python3-libhamlib2

pi@raspberrypi:~ \$ sudo apt-get autoremove -y --purge python3-libhamlib2 Reading package lists... Done Building dependency tree Reading state information... Done Package 'python3-libhamlib2' is not installed, so not removed The following packages will be REMOVED: python-colorzero* 0 upgraded, 0 newly installed, 1 to remove and 0 not upgraded. After this operation, 130 kB disk space will be freed. (Reading database ... 43295 files and directories currently installed.) Removing python-colorzero (1.1) ... pi@raspberrypi:~ \$ sudo apt-get install -y autoconf automake libtool swig

i@raspberrypi:~ \$ sudo apt-get install -y autoconf automake libtool swig Reading package lists... Done Building dependency tree Reading state information... Done The following additional packages will be installed: autotools-dev libltdl-dev libltdl7 libsigsegv2 m4 swig3.0 Suggested packages: autoconf-archive gnu-standards autoconf-doc gettext libtool-doc gfortran | fortran95-compiler gcj-jdk m4-doc swig-doc swig-examples swig3.0-examples swig3.0-doc The following NEW packages will be installed: autoconf automake autotools-dev libltdl-dev libltdl7 libsigsegv2 libtool m4 swig swig3.0 0 upgraded, 10 newly installed, 0 to remove and 0 not upgraded. Need to get 4,030 kB of archives. After this operation, 12.6 MB of additional disk space will be used. Get:1 http://ftp.igh.cnrs.fr/pub/os/linux/raspbian/raspbian buster/main armhf li bsigsegv2 armhf 2.12-2 [32.3 kB] Get:2 http://ftp.igh.cnrs.fr/pub/os/linux/raspbian/raspbian buster/main armhf m4 armhf 1.4.18-2 [185 kB] Get:3 http://ftp.igh.cnrs.fr/pub/os/linux/raspbian/raspbian buster/main armhf au toconf all 2.69-11 [341 kB] Get:4 http://ftp.igh.cnrs.fr/pub/os/linux/raspbian/raspbian buster/main armhf au totools-dev all 20180224.1 [77.0 kB] Get:5 http://ftp.igh.cnrs.fr/pub/os/linux/raspbian/raspbian buster/main armhf au tomake all 1:1.16.1-4 [771 kB]

Install the Hamlib library

```
cd ~/
git clone <u>https://github.com/Hamlib/Hamlib.git</u>
```

```
pi@raspberrypi:~ $ cd ~/
pi@raspberrypi:~ $ git clone https://github.com/Hamlib/Hamlib.git
Cloning into 'Hamlib'...
remote: Enumerating objects: 47578, done.
remote: Counting objects: 100% (4863/4863), done.
remote: Compressing objects: 100% (1784/1784), done.
remote: Total 47578 (delta 3542), reused 4235 (delta 3068), pack-reused 42715
Receiving objects: 100% (47578/47578), 18.30 MiB | 333.00 KiB/s, done.
Resolving deltas: 100% (37673/37673), done.
pi@raspberrypi:~ $ cd Hamlib/
pi@raspberrypi:~/Hamlib $
```

cd Hamlib/ ./bootstrap

pi@raspberrypi:~/Hamlib \$ ./bootstrap Running 'autoreconf -i' to process configure.ac and generate the configure script. aclocal: installing 'macros/libtool.m4' from '/usr/share/aclocal/libtool.m4' aclocal: installing 'macros/ltoptions.m4' from '/usr/share/aclocal/ltoptions.m4' aclocal: installing 'macros/ltsugar.m4' from '/usr/share/aclocal/ltsugar.m4' aclocal: installing 'macros/ltversion.m4' from '/usr/share/aclocal/ltversion.m4' aclocal: installing 'macros/lt~obsolete.m4' from '/usr/share/aclocal/lt~obsolete.m4' aclocal: installing 'macros/pkg.m4' from '/usr/share/aclocal/pkg.m4' libtoolize: putting auxiliary files in AC CONFIG AUX DIR, 'build-aux'. libtoolize: copying file 'build-aux/ltmain.sh' configure.ac:95: installing 'build-aux/ar-lib' configure.ac:26: installing 'build-aux/compile' configure.ac:126: installing 'build-aux/config.guess' configure.ac:126: installing 'build-aux/config.sub' configure.ac:35: installing 'build-aux/install-sh' configure.ac:35: installing 'build-aux/missing' amplifiers/elecraft/Makefile.am: installing 'build-aux/depcomp' bindings/Makefile.am:106: installing 'build-aux/py-compile' parallel-tests: installing 'build-aux/test-driver' pi@raspberrypi:~/Hamlib \$

./configure --with-python-binding PYTHON=\$(which python3)

pi@raspberrypi:~/Hamlib \$ ./configurewith-python-binding PYTHON=\$(which python3)
checking for gcc gcc
checking whether the C compiler works yes
checking for C compiler default output file name a.out
checking for suffix of executables
checking whether we are cross compiling no
checking for suffix of object files o
checking whether we are using the GNU C compiler yes
checking whether gcc accepts -g yes
checking for gcc option to accept ISO C89 none needed
checking whether gcc understands -c and -o together yes
checking how to run the C preprocessor gcc -E
checking for grep that handles long lines and -e /usr/bin/grep
checking for egrep /usr/bin/grep -E
checking for ANSI C header files yes
checking for sys/types.h yes
checking for sys/stat.h yes
checking for stdlib.h yes
checking for string.h yes
checking for memory.h yes
checking for strings.h yes
checking for inttypes.h yes
checking for stdint.h yes
checking for unistd.h yes
checking minix/config h usability

make all && sudo make install && cd bindings && make && sudo
make install && sudo ldconfig

The compilation is quite long, wait about 10 minutes

Hamlib Version 4.4~git configur	ation:				
Prefix /usr/local					
Preprocessor gcc -E					
C Compiler gcc -g -O2					
C++ Compiler g++ -std=c++11 -	g -02				
Package features:					
With C++ binding	yes				
With Perl binding	no				
With Python binding	yes				
With TCL binding	no				
With Lua binding	no				
With rigmem XML support	no				
With Readline support	no				
With INDI support	no				
Enable HTML rig feature matr	ix no				
Enable WinRadio	yes				
Enable USRP	no				
Enable USB backends	no				
Enable shared libs	yes				
Enable static libs	yes				
ni@raspherruni:~/Hamlib \$ make a					
dconfig	i de selo mart install de ce sindings de mart de selo mart install de selo i				
Making all in macros					
make[1]: Entering directory '/ho	me/pi/Hamlib/macros'				
make[1]: Nothing to be done for	'all'.				
make[1]: Leaving directory '/hom	e/pi/Hamlib/macros'				
Making all in include					
make[1]: Entering directory '/home/pi/Hamlib/include'					
make all-am					
<pre>make[2]: Entering directory '/home/pi/Hamlib/include'</pre>					
<pre>make[2]: Leaving directory '/home/pi/Hamlib/include'</pre>					
make[1]: Leaving directory '/home/pi/Hamlib/include'					
Making all in lib					
make[1]: Entering directory '/ho	me/pi/Hamlib/lib'				
CC termios.lo					
CC dummy.lo					

Restart the Raspberry PI, then reconnect in ssh with putty.

## sudo reboot

- have your system administrator add LIBDIR to '/etc/ld.so.conf'
See any operating system documentation about shared libraries for more information, such as the ld(1) and ld.so(8) manual pages.
<pre>/usr/bin/mkdir -p '/usr/local/share/doc/hamlib/examples' /usr/bin/install -c -m 644 py3test.py '/usr/local/share/doc/hamlib/examples' make[2]: Leaving directory '/home/pi/Hamlib/bindings' make[1]: Leaving directory '/home/pi/Hamlib/bindings' pi@raspberrypi:~ \$ sudo reboot</pre>

### Install F4HTB software

cd ~/ git clone <u>https://github.com/F4HTB/Universal HamRadio Remote HTML5.git</u>

```
pi@raspberrypi:~ $ cd ~/
pi@raspberrypi:~ $ git clone https://github.com/F4HTB/Universal_HamRadio_Remote_
HTML5.git
Cloning into 'Universal_HamRadio_Remote_HTML5'...
remote: Enumerating objects: 556, done.
remote: Counting objects: 100% (7/7), done.
remote: Compressing objects: 100% (7/7), done.
remote: Total 556 (delta 2), reused 0 (delta 0), pack-reused 549
Receiving objects: 100% (556/556), 3.79 MiB | 327.00 KiB/s, done.
Resolving deltas: 100% (348/348), done.
pi@raspberrypi:~ $ cd ~/Universal_HamRadio_Remote_HTML5
pi@raspberrypi:~/Universal_HamRadio_Remote_HTML5 $
```

Finish by starting the UHRR server

```
cd ~/Universal_HamRadio_Remote_HTML5
PYTHONPATH=/usr/local/lib/python3.7/site-packages:$PYTHONPATH ./UHRR
```

```
pi@raspberrypi:~/Universal_HamRadio_Remote_HTML5 $ PYTHONPATH=/usr/local/lib/pyt
hon3.7/site-packages:$PYTHONPATH ./UHRR
ALSA lib pcm_hw.c:1822:(_snd_pcm_hw_open) Invalid value for card
(<class 'alsaaudio.ALSAAudioError'>, ALSAAudioError('No such device [plughw:CARD
=U0x41e0x30d3,DEV=0]'), <traceback object at 0xb3d394b8>)
HTTP server started.
```

### Console summary :

```
sudo apt-get update && sudo apt-get upgrade -y && sudo reboot
sudo apt-get install -y git python3 python3-pip python3-numpy python3-tornado python3-serial python3-pyaudio
rtl-sdr
sudo pip3 install pyalsaaudio pam pyrtlsdr
sudo apt-get autoremove -y --purge python3-libhamlib2
sudo apt-get install -y autoconf automake libtool swig
cd ~/
git clone https://github.com/Hamlib/Hamlib.git
cd Hamlib/
./bootstrap
./configure --with-python-binding PYTHON=$(which python3)
make all && sudo make install && cd bindings && make && sudo make install && sudo ldconfig
sudo reboot
cd ~/
git clone https://github.com/F4HTB/Universal HamRadio Remote HTML5.git
```

cd ~/Universal_HamRadio_Remote_HTML5 PYTHONPATH=/usr/local/lib/python3.7/site-packages:\$PYTHONPATH ./UHRR

## 13.3 Basic Setup

With a browser (Firefox for example) access the server using the URL.

```
https://raspberrypi.local:8888/
ou:
https://192.168.1.44:8888/
```

By specifying the IP address of your Raspberry pi, 192.168.1.44 is given as an example.

### Add the security exception

ht

tps:// <b>19</b>	2.168.1.44:8888	\$	Q Rechercher
	Attention : risque probable de séc Firefox a détecté une menace de sécurité potentielle et n'a pas pourse des attaquants pourraient dérober des informations comme vos mots bancaire.	CURITÉ uivi vers 192.168.1.44. Si v de passe, courriels, ou d	rous accédez à ce site, onnées de carte
	En savoir plus		
		Retour (recommand	lé) Avancé
	192.168.1.44:8888 utilise un certificat de sécurité invalide. Le certificat n'est pas sûr car il est auto-signé. Code d'erreur : MOZILLA_PKIX_ERROR_SELF_SIGNED_CERT		
	Afficher le certificat		
	Retour (recommand	dé) Accepter le ri	sque et poursuivre



A configuration page appears. Configure the various menus concerning the sound card and the transceiver used.

Do not forget to click on "save and restart server" to save the configuration.

← → C @ https://192.168.1.44:8888				
[SERVER]				
SERVER TCP/IP port: 8888 Defauti: 8888. The server port				
SERVER Authentification type: Defaut1:leave blank. Else you can use "FILE" or/and "PAM".				
SERVER database users file: UHRR_users.db Defaut1: UHRR_users.db Only if you use Authentification type "FILE".				
You can change database users file in UHRR.conf. To add a user in FILE type, add it in UHRR_users.db (default file name). Add one account per line as login password. If you plan to use PAM you can add account in command line: adduserno-create-homesystem thecallsign.				
If you whant to change certfile and keyfile, replace "UHRH.crt" and "UHRH.key" in the boot folder, and when the pi boot, it will use those files to start http ssl.				
[AUDIO]				
AUDIO outputdevice: plughw:CARD=CODEC,DEV=0				
AUDIO inputdevice: plughw:CARD=CODEC,DEV=0 v Input from audio soundcard from the speaker output of TRX.				
[HAMLIB]				
HAMLIB radio model: IC7300 v Hamlib trx model.				
HAMLIB serial port: //dev/ttyUSB0 v Serial port of the CAT interface.				
HAMLIB radio rate: 4800 v Serial port baud rate.				
HAMLIB auto tx poweroff: True v Set to auto power off the trx when it's not in use				
HAMLIB serial data bits: Leave blank to use the HAMIB default value.				
HAMILIB serial stop bits: Leave blank to use the HAMIB default value.				
HAMLIB serial parity: Leave blank to use the HAMIB default value.				
HAMLIB serial handshake: Leave blank to use the HAMIB default value.				
HAMLIB dtr state: Leave blank to use the HAMIB default value.				
HAMLIB rts state: Leave blank to use the HAMIB default value.				
[PANADAPTER]				
PANADAPTER FI frequency (hz): 68330000				
HAMLIB radio rate (samples/s): 960000				
PANADAPTER frequency correction (ppm): 1				
PANADAPTER initial gain: 10				
PANADAPTER windowing: hamming ~				
Save & Restart server				

Do not forget to connect a headset microphone to the PC to allow the use of the microphone or other audio source.



Finally the long-awaited interface

Click on the start button. The sound from the transceiver must be heard through the headphones. Otherwise, click on "the blue adjustable wrench" at the top right to return to the configuration menu.

	8.1.44:8888	80% 公	Q Rechercher	${igar {\sigma}}$
				f4goh 👋
		USB	LSB	1 3 5 7 9 +20 +40 +60
	007.100.000	CW	AM	S5 (-24dB) SQL:©────
		FM		160m 80m 40m 30m 20m 17m
RX volume:		o _n der te statistick besette die alle alle alle statistices an	N Aran Vên bêzê tetakên werdî de	15m11m12m10m6m4m2m70cmWWWPersonal Freqsrecall delete save
MIC GAIN:	None         LP 4.4k         LP 3.3k           LP 2.7k         LP 2.1k         LP 1.0k			ТХ
	BP 300Hz BP 500Hz BP 800Hz BP 1kHz BP click Custom			TX Lock
		wsTX	🛚 wsRX 🔽 wsCtrl	latency:37ms

## **13.4 Conclusion**

Congratulation Olivier (F4HTB) for this magnificent achievement. The graphical interface is very ergonomic and will delight OMs wishing to control their station remotely.

73 and good remote.



# Igate APRS Part 14



## Summary :

## Part 14 : Igate APRS

Prerequisite: Part 4: Using the Raspbian Lite operating system without a graphical interface.

14.1 Raspbian Lite operating system	P. 2
14.2 Updating the operating system	P. 3
14.3 RTL-SDR key installation	P. 4
14.4 Direwolf installation	P. 8
14.5 Direwolf setup with the RTL-SDR	P. 13
14.6 Configuration test	P. 15
14.7 Run Direwolf at the RPI startup démarrage du RPI	P. 16
14.8 Direwolf setup with an external USB sound card	P. 20
14.9 Conclusion	P. 23

The creator of the APRS system is **Bob Bruninga**, WB4APR.

This document contains the information at the following link with screenshots.

https://github.com/wb2osz/direwolf/blob/master/doc/Raspberry-Pi-SDR-IGate.pdf https://github.com/wb2osz/direwolf/blob/master/doc/User-Guide.pdf

Version du 24/04/2022 V1.0 sur RPI4

Download the latest version of Pi Imager https://www.raspberrypi.com/software/

Download for Windo	ws	
Download for macOS Download for Ubuntu for	<u>x86</u>	
https://downloads.raspberrypi.org/image	er/imager_latest.exe	
Raspberry Pi OS Lite (32-bit) A port of Debian Bullseye with no desktop environment Sorti le : 2022-04-04 Mis en cache sur votre ordinateur	Choose Raspberry PI OS Li	
Raspberry Pi Imager v1.7.2     Image customization options     X	It is recommended to pre-configure the disk image:	
<ul> <li>☐ Set hostname: raspberrypilocal</li> <li>✓ Enable SSH</li> <li>④ Use password authentication</li> </ul>	- Enable SSH Username: pi Password: raspberry	
Set authorized_keys for 'p':	- Configure WIFI access	
Password: ●●●●●● Configure wireless LAN SSID: ●●●●●● Hidden SSID Password: ●●●●●● Show password	configuration according to the country.	
Wireless LAN country: FR		
Persistent settings		

Save the configuration, then start writing to the mSd memory card.

Once the card has been inserted into the Raspberry Pi and powered up, identify the IP address of the Raspberry PI connected to your Wifi network (box in red).

Reminder: In the console window :

### ifconfig

```
pi@raspberrypi:~
eth0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
       ether dc:a6:32:e6:dc:dc txqueuelen 1000 (Ethernet)
RX packets 0 bytes 0 (0.0 B)
       RX errors 0 dropped 0 overruns 0 frame 0
       TX packets 0 bytes 0 (0.0 B)
       TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
       inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
       loop txqueuelen 1000 (Local Loopback)
       RX packets 10 bytes 1600 (1.5 KiB)
       RX errors 0 dropped 0 overruns 0
                                            frame 0
       TX packets 10 bytes 1600 (1.5 KiB)
       TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
       inet 192.168.1.44 netmask 255.255.255.0 broadcast 192.168.1.255
       inet6 fe80::7bed:6545:85b3:3ef9 prefixlen 64 scopeid 0x20<link>
       ether dc:a6:32:e6:dc:dd txqueuelen 1000
                                                 (Ethernet)
       RX packets 11530 bytes 15366617 (14.6 MiB)
       RX errors 0 dropped 55 overruns 0 frame 0
        TX packets 5973 bytes 594867 (580.9 KiB)
       TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Performing an update of the packages :

### sudo apt update

```
pi@raspberrypi:~ $ sudo apt update
Get:1 http://raspbian.raspberrypi.org/raspbian bullseye InRelease [15.0 kB]
Get:2 http://archive.raspberrypi.org/debian bullseye InRelease [23.7 kB]
Get:3 http://raspbian.raspberrypi.org/raspbian bullseye/main armhf Packages [13.
2 MB]
Get:4 http://archive.raspberrypi.org/debian bullseye/main armhf Packages [279 kB
]
Fetched 13.5 MB in 17s (782 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
10 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

Reminder: To copy and paste a line from the pdf file into putty :

- Select the line with the mouse;
- Right click and copy, or Ctrl+c ;
- Select the putty window with a left click;
- Select the Putty window with a left click; Then right click with the mouse.

#### sudo apt upgrade

```
pi@raspberrypi:~ $ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages will be upgraded:
  gzip liblzma5 libraspberrypi-bin libraspberrypi-dev libraspberrypi-doc
  libraspberrypi0 pi-bluetooth raspi-config userconf-pi xz-utils
```

## 14.3 RTL-SDR key installation (already described in part 3)

Start by installing git :

## sudo apt-get install git



git clone https://github.com/osmocom/rtl-sdr.git

pi@raspberrypi:~ \$ git clone https://github.com/osmocom/rtl-sdr.git						
Clonage dans 'rtl-sdr'						
remote: Enumerating objects: 65, done.						
remote: Counting objects: 100% (65/65), done.						
remote: Compressing objects: 100% (38/38), done.						
remote: Total 1863 (delta 25), reused 55 (delta 23), pack-reused 1798						
Réception d'objets: 100% (1863/1863), 448.80 KiB   1.11 MiB/s, fait.						
Résolution des deltas: 100% (1317/1317), fait.						
pi@raspberrypi:~ \$ ls						
audio Downloads Music <u>qsstv</u> Templates Videos						
Desktop GridTracker Pictures rtl-sdr tx_drm						
Documents MagPi Public templates tx_stock						
pi@raspberrypi:~ \$						

RPI part 14-V1.0.docx

Looking for pthread.h

Looking for pthread.h - found

Install the libraries.

### sudo apt install build-essential cmake usbutils libusb-1.0-0-dev

pi@raspberrypi:~/rtl-sdr/build \$ sudo apt install build-essential cmake usbutils
libusb-1.0-0-dev
Lecture des listes de paquets Fait
Construction de l'arbre des dépendances
Lecture des informations d'état Fait
build-essential est déjà la version la plus récente (12.6).
usbutils est déjà la version la plus récente (1:010-3).
Les paquets suivants ont été installés automatiquement et ne sont plus nécessair
es :
libmicrodns0 libqt5charts5 xlog-data
Veuillez utiliser « sudo apt autoremove » pour les supprimer.
Les paquets supplémentaires suivants seront installés :
cmake-data libjsoncpp1 librhash0 libusb-1.0-doc libuv1
Paquets suggérés :
cmake-doc ninja-build
Les NOUVEAUX paquets suivants seront installés :
cmake cmake-data libjsoncpp1 librhash0 libusb-1.0-0-dev libusb-1.0-doc
libuv1
0 mis à jour, 7 nouvellement installés, 0 à enlever et 0 non mis à jour.
Il est nécessaire de prendre 40578 ko dans les archives.
Après cette opération, 23,6 Mo d'espace disque supplémentaires seront utilisés.
Souhaitez-vous continuer ? [O/n]

Type these commands in order:

cd rtl-sdr
mkdir build
cd build
cmake -DINSTALL_UDEV_RULES=ON -DDETACH_KERNEL_DRIVER=ON/
pi@raspberrypi:~ \$ cd rtl-sdr/ pi@raspberrypi:~/rtl-sdr \$ mkdir build
pi@raspberrypi:~/rtl-sdr \$ cd build/
pi@raspberrypi:~/rtl-sdr/build \$ cmake -DINSTALL_UDEV_RULES=ON -DDETACH_KERNEL_D
RIVER=ON/
The C compiler identification is GNU 8.3.0
Check for working C compiler: /usr/bin/cc
Check for working C compiler: /usr/bin/cc works
Detecting C compiler ABI info - done
Detecting C compile features
Detecting C compile features - done
Build type not specified: defaulting to release.
Extracting version information from git describe

sudo make install

#### pi@raspberrypi:~/rtl-sdr/build \$ sudo make install Scanning dependencies of target convenience_static [ 3%] Building C object src/CMakeFiles/convenience_static.dir/convenience/convenience.c.o [ 6%] Linking C static library libconvenience_static.a [ 6%] Built target convenience_static Scanning dependencies of target rtlsdr [ 9%] Building C object src/CMakeFiles/rtlsdr.dir/librtlsdr.c.o [ 12%] Building C object src/CMakeFiles/rtlsdr.dir/librtlsdr.c.o [ 15%] Building C object src/CMakeFiles/rtlsdr.dir/tuner_e4k.c.o [ 15%] Building C object src/CMakeFiles/rtlsdr.dir/tuner_fc0012.c.o [ 18%] Building C object src/CMakeFiles/rtlsdr.dir/tuner_fc0013.c.o [ 21%] Building C object src/CMakeFiles/rtlsdr.dir/tuner_fc2580.c.o [ 25%] Building C object src/CMakeFiles/rtlsdr.dir/tuner_r82xx.c.o [ 28%] Linking C shared library librtlsdr.so

## sudo ldconfig

	Set runtime	path of "/usr/local/bin/rtl_fm" to ""
	Installing:	/usr/local/bin/rtl_eeprom
	Set runtime	<pre>path of "/usr/local/bin/rtl_eeprom" to ""</pre>
	Installing:	/usr/local/bin/rtl adsb
	Set runtime	path of "/usr/local/bin/rtl_adsb" to ""
	Installing:	/usr/local/bin/rtl_power
	Set runtime	path of "/usr/local/bin/rtl_power" to ""
pi(	raspberrypi	:~/rtl-sdr/build \$ sudo ldconfig
pi(	raspberrypi	-/rtl-sdr/build \$

## sudo nano /etc/modprobe.d/rtlsdr-blacklist.conf

pi@raspberrypi:~/rtl-sdr/build \$ sudo nano /etc/modprobe.d/rtlsdr-blacklist.conf

```
blacklist dvb_usb_rtl28xxu
blacklist rtl2832
blacklist rtl2830
blacklist dvb_usb_rtl2832u
blacklist dvb_usb_v2
blacklist dvb_core
```

Copy and paste the above list into the nano editor

### Right click to paste the text into the nano editor





Reboot the Raspberry PI

pi@raspberrypi:~/rtl-sdr/build \$ sudo reboot

## sudo reboot

Verification: Plug the rtl-sdr into a USB port on the Raspberry Pi. With LXTerminal or Putty, type the following command line:

### lsusb

Locate the rtl-sdr key: RTL238 DVB-T

#### Case of the Raspberry Pi 3 :

pi@raspberrypi:~ \$ lsusb Bus 001 Device 004: ID 0bda:2838 Realtek Semiconductor Corp. RTL2838 DVB-T Bus 001 Device 003: ID 0424:ec00 Standard Microsystems Corp. SMSC9512/9514 Fast Ethernet Adapter Bus 001 Device 002: ID 0424:9514 Standard Microsystems Corp. SMC9514 Hub Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub



F4GOH – KF4GOH

Case of the Raspberry Pi 4 :

pi@:	raspł	perrypi	~ \$ ]	lsus	3b	
Bus	002	Device	001:	ID	1d6b:0003	Linux Foundation 3.0 root hub
Bus	001	Device	003:	ID	0bda:2838	Realtek Semiconductor Corp. RTL2838 DVB-T
Bus	001	Device	002:	ID	2109:3431	VIA Labs, Inc. Hub
Bus	001	Device	001:	ID	1d6b:0002	Linux Foundation 2.0 root hub

With LXTerminal or Putty, type the following command line: (beware ofundescore key)

rtl_test

The rtl-sdr key should be recognised, if not, disconnect and reconnect the key and repeat the test.



Exit the program by pressing the Ctrl key and the c key simultaneously (Ctrl+c)

If rtl_test displays this message in a loop lost at least 112 bytes, reinstall the program using the manual method.

## 14.4 Direwolf installation

The best linux software to manage APRS is <u>Direwolf</u>, designed by John, wb2osz. This one works very well with an RTL-SDR key.

Checking the prerequisites: Normally these utilities are already installed in the operating system, but it is still prudent to check.

sudo apt-get install gcc
sudo apt-get install g++
sudo apt-get install make
sudo apt-get install cmake

i@raspberrypi:~ \$ sudo apt-get install gcc Lecture des listes de paquets... Fait Construction de l'arbre des dépendances Lecture des informations d'état... Fait gcc est déjà la version la plus récente (4:8.3.0-1+rpi2). gcc passé en « installé manuellement ». Le paquet suivant a été installé automatiquement et n'est plus nécessaire : python-colorzero Veuillez utiliser « sudo apt autoremove » pour le supprimer. 0 mis à jour, 0 nouvellement installés, 0 à enlever et 0 non mis à jour. pi@raspberrypi:~ \$ sudo apt-get install g++ Lecture des listes de paquets... Fait Construction de l'arbre des dépendances Lecture des informations d'état... Fait g++ est déjà la version la plus récente (4:8.3.0-1+rpi2). g++ passé en « installé manuellement ». Le paquet suivant a été installé automatiquement et n'est plus nécessaire : python-colorzero /euillez utiliser « sudo apt autoremove » pour le supprimer. 0 mis à jour, 0 nouvellement installés, 0 à enlever et 0 non mis à jour. pi@raspberrypi:~ \$ sudo apt-get install make Lecture des listes de paquets... Fait Construction de l'arbre des dépendances Lecture des informations d'état... Fait make est déjà la version la plus récente (4.2.1-1.2). make passé en « installé manuellement ». Le paquet suivant a été installé automatiquement et n'est plus nécessaire : python-colorzero Veuillez utiliser « sudo apt autoremove » pour le supprimer. 0 mis à jour, 0 nouvellement installés, 0 à enlever et 0 non mis à jour. pi@raspberrypi:~ \$ sudo apt-get install cmake Lecture des listes de paquets... Fait Construction de l'arbre des dépendances Lecture des informations d'état... Fait cmake est déjà la version la plus récente (3.16.3-3~bpo10+1). Le paquet suivant a été installé automatiquement et n'est plus nécessaire : python-colorzero Veuillez utiliser « sudo apt autoremove » pour le supprimer. O mis à jour, O nouvellement installés, O à enlever et O non mis à jour. i@raspberrypi:~ \$

#### Installing sound libraries

### sudo apt-get install libasound2-dev





Download the Direwolf source code using git

## git clone https://www.github.com/wb2osz/direwolf

pi@raspberrypi:~ \$ git clone https://www.github.com/wb2osz/direwolf Clonage dans 'direwolf'... warning: redirection vers https://github.com/wb2osz/direwolf.git/ remote: Enumerating objects: 2945, done. remote: Counting objects: 100% (105/105), done. remote: Compressing objects: 100% (74/74), done. remote: Total 2945 (delta 43), reused 67 (delta 30), pack-reused 2840 Réception d'objets: 100% (2945/2945), 134.50 MiB | 154.00 KiB/s, fait. Résolution des deltas: 100% (1998/1998), fait. pi@raspberrypi:~ \$

Go to the Direwolf directory, then create a build directory.

## cd direwolf git checkout dev mkdir build && cd build

```
pi@raspberrypi:~ $ cd direwolf
pi@raspberrypi:~/direwolf $ git checkout dev
Branch 'dev' set up to track remote branch 'dev' from 'origin'.
Switched to a new branch 'dev'
pi@raspberrypi:~/direwolf $ mkdir build && cd build
pi@raspberrypi:~/direwolf/build $
```

## cmake ..

pi@raspberrypi:~/direwolf/build \$ cmake
The C compiler identification is GNU 8.3.0
^[[D The CXX compiler identification is GNU 8.3.0
Check for working C compiler: /usr/bin/cc
Check for working C compiler: /usr/bin/cc works
Detecting C compiler ABI info
Detecting C compiler ABI info - done
Detecting C compile features
Detecting C compile features - done
Check for working CXX compiler: /usr/bin/c++
Check for working CXX compiler: /usr/bin/c++ works
Detecting CXX compiler ABI info
Detecting CXX compiler ABI info - done
Detecting CXX compile features
Detecting CXX compile features - done
Found Git: /usr/bin/git (found version "2.20.1")
Dire Wolf Version: 1.7.0-b66c21d
Build type set to: Release
CMake system: Linux
Target architecture: ARM
Use NEON SIMD instructions
Looking for strlcpy
Looking for strlcpy - not found
Looking for strlcat
Looking for strlcat - not found

## make -j4

pi@raspberrypi:~/direwolf/build \$ make -j4
Scanning dependencies of target misc
Scanning dependencies of target geotranz
[ 1%] Building C object external/misc/CMakeFiles/misc.dir/strlcat.c.o
[ 1%] Building C object external/misc/CMakeFiles/misc.dir/strlcpy.c.o
[ 2%] Building C object external/geotranz/CMakeFiles/geotranz.dir/error_string.c.d
[ 2%] Building C object external/geotranz/CMakeFiles/geotranz.dir/mgrs.c.o
[ 2%] Building C object external/geotranz/CMakeFiles/geotranz.dir/polarst.c.o
[ 3%] Linking C static library libmisc.a
[ 4%] Building C object external/geotranz/CMakeFiles/geotranz.dir/tranmerc.c.o
[ 4%] Built target misc
Scanning dependencies of target text2tt
[ 4%] Building C object src/CMakeFiles/text2tt.dir/tt_text.c.o
[ 4%] Building C object external/geotranz/CMakeFiles/geotranz.dir/ups.c.o
[ 5%] Building C object external/geotranz/CMakeFiles/geotranz.dir/usng.c.o
[ 5%] Building C object external/geotranz/CMakeFiles/geotranz.dir/utm.c.o
Scanning dependencies of target atest
[ 5%] Building C object src/CMakeFiles/atest.dir/atest.c.o
[ 6%] Building C object src/CMakeFiles/atest.dir/ais.c.o
[ 8%] Linking C executable text2tt
[ 96%] Building C object src/CMakeFiles/direwolf.dir/xmit.c.o
[ 97%] Building C object src/CMakeFiles/direwolf.dir/dwgpsd.c.o
[ 97%] Building C object src/CMakeFiles/direwolf.dir/dwgpsnmea.c.o
[ 98%] Building C object src/CMakeFiles/direwolf.dir/mheard.c.o
[ 98%] Building C object src/CMakeFiles/direwolf.dir/audio.c.o
[100%] Building C object src/CMakeFiles/direwolf.dir/cm108.c.o
[100%] Linking C executable direwolf
[100%] Built target direwolf
pi@raspberrypi:~/direwolf/build \$

pi@raspberrypi:~/direwolf/build \$ sudo make install
<pre>[ 4%] Built target geotranz</pre>
<pre>[ 6%] Built target misc</pre>
<pre>[ 9%] Built target ll2utm</pre>
<pre>[ 10%] Built target text2tt</pre>
[ 12%] Built target utm211
[ 28%] Built target atest
[ 31%] Built target aclients
[ 40%] Built target decode_aprs
[ 44%] Built target kissutil
[ 45%] Built target log2gpx
[ 47%] Built target tt2text
<pre>[ 55%] Built target gen_packets</pre>
[ 91%] Built target direwolf
[ 93%] Built target cm108
[ 95%] Built target ttcalc
[100%] Built target appserver
Install the project
Install configuration: "Release"
Installing: /usr/local/share/doc/direwolf/CHANGES.md
Installing: /usr/local/share/doc/direwolf/LICENSE
Installing: /usr/local/share/doc/direwolf/external/LICENSE
Installing: /usr/local/share/applications/direwolf.desktop
Installing: /usr/local/share/pixmaps/direwolf icon.png

### sudo make install

## make install-conf



## 14.5 Direwolf setup with the RTL-SDR

Return to the /home/pi directory

You can see that sample Direwolf configurations have been created. These files end with the .conf extension.

```
pi@raspberrypi:~/direwolf/build $ cd ~
pi@raspberrypi:~ $ pwd
/home/pi
pi@raspberrypi:~ $ ls
direwolf dw-start.sh sdr.conf telem-m0xer-3.txt
direwolf.conf rtl-sdr telem-balloon.conf telem-volts.conf
pi@raspberrypi:~ $
```

# Obtain an encrypted password for the APRS server using the following address <u>https://aprs.do3sww.de/</u>



Edit the sdr.conf file

## nano sdr.conf

Change the lines according to your callsign and geographical location.

🛃 pi@raspberrypi: ~	
GNU nano 5.4	sdr.conf
<pre># Sample configuration for SDR #</pre>	read-only IGate.
# We might not have an audio ou	iput device so set to null.
# We will override the input ha	If on the command line.
ADEVICE null null	
CHANNEL O	
MICALL F4GON	
<pre># First you need to specify the # The current preferred way is</pre>	name of a Tier 2 server. to use one of these regional rotate addresses:
# noam.aprs2.net	- for North America
<pre># soam.aprs2.net</pre>	- for South America
<pre># euro.aprs2.net</pre>	- for Europe and Africa
# asia.aprs2.net	- for Asia
<pre># aunz.aprs2.net</pre>	- for Oceania
IGSERVER euro.aprs2.net	
# You also need to specify your	login name and passcode.
# Contact the author if you can	t figure out how to generate the passcode.
<pre># https://aprs.do3sww.de/</pre>	
IGLOGIN F4GOH 15001	
PBEACON sendto=IG delay=0:30 ev	<pre>ry=60:00 symbol="igate" overlay=R lat=47^53.41N long=000^16.60E COMMENT="https://hamprojects.wordpress.com/"</pre>

It is possible to add the command PBEACON which will report the position of the igate on <a href="https://aprs.fi">https://aprs.fi</a>



PBEACON must be on the same line!

### 14.6 Configuration test

Run the following command:

rtl fm -f 144.80M - | direwolf -c sdr.conf -r 24000 -D 1 -



Then check that the igate appears on https://aprs.fi





If the command line is mistyped or copied and pasted incorrectly, the program will not run correctly as the following example shows:

pi@raspberrypi:~ \$ rtl_fm -f 144.80M -   direwolf -c sdr.conf -r 24000 -D 1 - Dire Wolf DEVELOPMENT version 1.7 E (Apr 23 2022) Includes optional support for: cm108-ptt					
Reading config file sdr.conf Audio input device for receive: - (channel 0) Audio out device for transmit: null (channel 0) ALSA lib pcm.c:2660:(snd_pcm_open_noupdate) Unknown PCM - Could not open audio device - for input No such file or directory Pointless to continue without audio device.					
<pre>Found 1 device(s):     0: Realtek, RTL2838UHIDIR, SN: 00000001</pre>					
Using device 0: Generic RTL2832U OEM Found Rafael Micro R820T tuner Tuner gain set to automatic. Tuned to 145052000 Hz. Oversampling input by: 42x. Oversampling output by: 1x. Buffer size: 8.13ms					
Exact sample rate is: 1008000.009613 Hz Sampling at 1008000 S/s. Output at 24000 Hz. Signal caught, exiting!					

The other solution is to download a ready-made script, change the execution rights and then run it.



Use an APRS Tracker to send a test frame to confirm correct decoding.

Use to send a test frame, to confirm correct decoding.

i@raspberrypi:~ \$ chmod +x runsdr.sh

i@raspberrypi:~ \$ ./runsdr.sh

My F4GOH-12 tracker appears well in the console and on https://aprs.fi



## 14.7 Run Direwolf at the RPI startup démarrage du RPI

Exit the program with Ctrl + c.



Install the screen software

### sudo apt install screen



Rename the existing dw-start.sh file to dw-start.sh.bak, so as not to lose it. Download the configured dw-start.sh script and change the execution rights.

Run the dw-start.sh file, then wait 30 seconds

./dw-start.sh

Once the script is active, check again at <u>https://aprs.fi</u> to see if the beacon frame has been sent.

Once the script is active, check again on sending the tag frame.



Edit the crontab task scheduler by choosing option 1 (nano editor)

### crontab -e



At the end of the file add the following line

/home/pi/dw-start.sh >/dev/null 2>&1 * * * * *





Reminder:

Save the file using the Ctrl + o keys, then the enter key to validate the saving.	Exit the editor using Ctrl + x
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} \text{Éch} & 2 \\ \text{$1$} & 2 \\ \text{$4$} & \text{$4$} & 5 \\ \text{$6$} & 7 \\ \text{$8$} & 9 \\ \text{$0$} & \text{$6$} & \text{$7$} \\ \text{$6$} & \text{$2$} & \text{$6$} \\ \text{$7$} & \text{$6$} & \text{$7$} \\ \text{$7$} & \text{$6$} & \text{$7$} \\ \text{$7$} & \text{$6$} & \text{$7$} \\ \text{$7$} & \text{$7$} \text{$7$} & \text{$7$} & \text{$7$} & \text{$7$} \\ \text{$7$} & \text{$7$} \\ \text{$7$} & $
Verr. maj q s d f g h j k l m $\%$ $\mu_{\star}$	Verr. maj q s d f g h j k l m % µ *
W         X         C         V         D         I1         ,         ;         :         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !         !	Maj > W X C V b n ?, ; / § Maj † suppr Ctrl 2 Alt Alt AltGr  Fn Ctrl + + +

A message appears after exiting the editor "installing new crontab".



Reboot the Raspberry

sudo reboot

Direwolf will run in the background when the Raspberry PI is rebooted.



Wait one minute, then check again on <u>https://aprs.fi</u>that the sending of the beacon and tracker frames is working properly.



2022-04-24 12:24:05 CEST: **F4GOH-12**>F4GOH,WIDE1-1,WIDE2-1,qAO,F4GOH:/102400h4753.41N/00016.60Eb/A=000276/73 Anthony 2022-04-24 12:24:35 CEST: **F4GOH-12**>F4GOH,WIDE1-1,WIDE2-1,qAO,F4GOH:/102430h4753.41N/00016.60Eb/A=000276/73 Anthony 2022-04-24 12:25:05 CEST: **F4GOH-12**>F4GOH,WIDE1-1,WIDE2-1,qAO,F4GOH:/102500h4753.41N/00016.60Eb/A=000276/73 Anthony

To stop the task scheduler :

### crontab -e

Add a # to the beginning of the line, then restart the RPI.

#* * * * * /home/pi/dw-start.sh >/dev/null 2>&1

sudo reboot



## 14.8 Direwolf setup with an external USB sound card

The hardware used for the following will be the modified cm108 USB sound card described in tutorial 11.



Plug the sound card into the Raspberry PI, then check for PTT control compatibility (1) and note the number of the recognised sound card in the RPI (2).

### crontab -e



Rename the original direwolf.conf file, then upload the preconfigured direwolf.conf file

mv direwolf.conf direwolf.conf.bak

wget https://github.com/f4goh/DRAPRS/raw/master/config_direwolf/soundcard/direwolf.conf



Custom configuration of the direwolf.conf file.

Edit the direwolf.conf file.

```
nano direwolf.conf
```

Indicate the number of the sound card. (Here in the RPI4, the external sound card is number 3)



Changing the callsign



Activate PTT control via the cm108 sound card



Send a signal transmitting the position of the igate. (Optional and useful if the RPI is not connected to the internet)



Activate the digipeater. (Radio transmission of heard frames)


Activate the igate and send the position of the igate (PBEACON) to the internet every 60 minutes.



#### Save the file Ctrl+o, Ctrl+x

Run the direwolf program, it loads the configuration file direwolf.conf by default

```
direwolf
```

```
pi@raspberrypi:~ $ direwolf
Dire Wolf DEVELOPMENT version 1.7 E (Apr 23 2022)
Includes optional support for: cm108-ptt
Reading config file direwolf.conf
Audio device for both receive and transmit: plughw:3,0 (channel 0)
Channel 0: 1200 baud, AFSK 1200 & 2200 Hz, A+, 44100 sample rate / 3.
Using /dev/hidraw0 GPIO 3 for channel 0 PTT control.
Ready to accept AGW client application 0 on port 8000 ...
Ready to accept KISS TCP client application 0 on port 8001 ...
Now connected to IGate server euro.aprs2.net (44.141.143.40)
Check server status here http://44.141.143.40:14501
[ig] # aprsc 2.1.5-g8af3cdc
[ig] # logresp F4GOH verified, server T2NORWAY
[ig] F4GOH>APDW17:!4753.42NR00016.60E&https://hamprojects.wordpress.com/
[0L] F4GOH>APDW17,WIDE1-1,WIDE2-1:!4753.42NS00016.60E#PHG7140Teloche
F4GOH-12 audio level = 24(6/4)
                                [NONE]
                                            [0.4] F4GOH-12>F4GOH,WIDE1-1,WIDE2-1:/123000h4753.41N/00016.61Eb/A=000229/73 Anthony
Position with time, BIKE
N 47 53.4100, E 000 16.6100, alt 70 m (229 ft)
 73 Anthony
 [0H] F4GOH-12>F4GOH, F4GOH*, WIDE2-1:/123000h4753.41N/00016.61Eb/A=000229/73 Anthony
```

Check on <u>https://aprs.fi</u> that the sending of the beacon and tracker frames is working properly.



Rename the existing dw-start.sh file to dw-start.sh.bak, so as not to lose it. Download the configured dw-start.sh script and change the execution rights.

```
mv dw-start.sh dw-start.sh.bak
wget https://github.com/f4goh/DRAPRS/raw/master/config_direwolf/soundcard/dw-start.sh
chmod +x dw-start.sh
```

Run the dw-start.sh file, then wait 30 seconds

```
./dw-start.sh
```

Once the script is active, check again at <u>https://aprs.fi</u> to see if the beacon frame has been sent.



Repeat the configuration of the "crontab" task scheduler described on pages 17, 18 and 19. **14.9 Conclusion** 

The APRS protocol is still widely used today. Its implementation requires few components and there is a lot of source code on the net. The Direwolf program is a good example, even if its configuration is sometimes a bit complex. However, the configuration possibilities are numerous. With an RTL-SDR key or a modified sound card, it will be easy to dedicate an igate at low cost.

Direwolf has supported the FX25 for several years.

https://en.wikipedia.org/wiki/FX.25_Forward_Error_Correction

The source code for a probe balloon tracker supporting the FX25 is available at the following address

https://github.com/PhilippeSimier/Radiocommunication/tree/master/projet_ballon

This tracker based on an (ESP32+DRA818) was programmed by Philippe and Anthony (F4GOH)

Direwolf is able to decode the FX25 by adding the -X 1 option to the "dw-start.sh" file

```
# 2. FX.25 Forward Error Correction (FEC) will allow your signal to
# go farther under poor radio conditions. Add "-X 1" to the command
line.
```

```
DWCMD="$DIREWOLF -a 100 -X 1"
```



# **ADS-B with Piaware** Part 15



Prerequisite: Discovering Raspberry PI Part 1

# Summary :

# Part 15: ADS-B with Piaware. 15.1 Introduction P. 2 15.2 Downloading and installing the Piaware image P. 3 15.3 Basic Configuration P. 4 15.4 Checking reception P. 6 15.5 Locating the listening station P. 6 15.6 Build the antenna P. 8 15.7 Adding the filter + LNA P. 8 **15.8 Conclusion** P. 11

Version du 02/08/2022 V1.0



# 15.1 Introduction.

Automatic Dependent Surveillance-Broadcast (ADS-B) is a cooperative surveillance system for air traffic control. An ADS-B equipped aircraft determines its position via a satellite positioning system and periodically sends this position and other information to ground stations and other ADS-B equipped aircraft operating in the area.

ADS-B is mandatory for large aircraft with a departure weight of more than 5.7 tons or a cruising speed of more than 250 KTAS (Knots True Airspeed).

Watch the video introduction: https://youtu.be/BDLFHdq540g



In order to simplify the software installation as much as possible, I use the Piaware environment provided by <u>flightaware.com</u>

Transmission protocol:

The aircraft sends a series of pulses on 1090 Mhz. After a preamble, the useful message is coded in Manchester format.

<u>8 µs</u>	112-bit extended data block						
Leading pulse	Downlink data	Capability field	ICAO o	ode	ADS-B data	Parity check	
	5 bits	3 bits	24 bi	ts	56 bits	24 bits	
						*********	
	[TC] [	STC] [Height	-ј т	F	[Latitude]	[Longitude]	
	00000	000 00000000000000000000000000000000000	00 0	0	000000000000000000000000000000000000000	000000000000000000000000000000000000000	

The rate is 1Mbits/s and the packet contain either 56 or 112 bits.

For more information on decoding a frame:

https://mode-s.org/decode/content/ads-b/1-basics.html

# 15.2 Downloading and installing the Piaware image.

Go to the download page:

https://fr.flightaware.com/adsb/piaware/build/ or https://flightaware.com/adsb/piaware/build/

Then download the zip file without LCD support.

Windows

Select and Download your desired PiAware SD card image
 PiAware PiAware Image on Raspbian Linux 7.2 ZIP (599MB)

Unzip the zip file and locate the **piaware-sd-card-7.2.img**, then use <u>https://www.balena.io/etcher</u> to copy the image to an MSD card.

piaware-sd-card-7.2.img	Setcher			×
🥵 PiAwareSetupGuide.pdf	<b>₽</b> –		7	
	<b>piaware-sd-7.2.img</b> 2.29 GB	Generic USB Device Change	Flash!	
	Change			
	bc	alena Etcher is an open source project by	💗 balena	1.4.9

Finish by enabling SSh by creating an empty file on the /boot partition of the SD card with the filename "ssh" only (no file extension). When this file is present, SSh will be automatically activated.

👝 boot (H:) ]]) overlays	start4db.elf
<b>A</b>	← ssh
	46 élé Type : Fichier Taille : 0 octets Modifié le : 02/08/2022 15:47

Tutoriel

# **15.3 Basic Configuration**

Tutoriel

Boot the Raspberry Pi with the rtl-sdr key connected. Start the command prompt on your machine, then type:



## ping piaware

C:\Windows\system32\cmd.exe					
Microsoft Windows [version 6.1.7601] Copyright (c) 2009 Microsoft Corporation. Tous droits réservés.					
C:\Users\anthony>ping piaware					
Envoi d'une requête 'ping' sur piaware.home [192.168.1.145] avec					
nnées : Réponse de 192.168.1.145 : octets=32 temps<1ms TTL=64 Réponse de 192.168.1.145 : octets=32 temps<1ms TTL=64 Réponse de 192.168.1.145 : octets=32 temps<1ms TTL=64 Réponse de 192.168.1.145 : octets=32 temps<1ms TTL=64					
Statistiques Ping pour 192.168.1.145: Paquets : envoyés = 4, reçus = 4, perdus = 0 (perte 0%), Durée approximative des boucles en millisecondes : Minimum = Oms, Maximum = Oms, Moyenne = Oms					
C:\Users\anthony>					

This allows you to know the IP address of the Raspberry Pi (RPI) on the local network.

With a browser such as Firefox, enter the following URL:

### http://piaware/

Or if that doesn't work, the IP address of the RPI. (IP 192.168.1.145 is given as an example).

### http://192.168.1.145/

The following homepage should appear with 3 green blocks and one red block.



Link your receiving station by creating an account with FlightAware. To do this click on:

#### Claim this feeder to associate it with your flight account.

La	ogin 🔉
f4goh@orange.fr  Forgot password?	Login >
Don't have an account? Register now (free) fo	or customized features, flight alerts, and more!

Once the registration is complete, this page should appear along with a confirmation email.



#### PiAware - Claim and Link a Brand New PiAware Ground Station



You claimed the following 1 receivers:

A link between the RPI and your account will be automatically created.

Check your account (main page) for a new menu "My ADS-B".

$\leftarrow$ $\rightarrow$ C $\textcircled{a}$	🔿 🔒 🔤 https://flightaware.co	om
🔻 f4goh 🔻 My FlightAv	ware My Alerts 🔻 My ADS-B	
L		
FlightAware		All 🔻 🔍
Products	Industries	

Return to the local RPI page (page 4), then click on



The position of the aircraft should be displayed together with the flight information in the right sidebar.

Go to SkyAware Map

# 15.5 Locating the listening station

Go to the statistics page (of course change f4goh to your login :).

https://flightaware.com/adsb/stats/user/f4goh

$\leftarrow \rightarrow$ C $\textcircled{a}$	🔿 🖰 🗝 https://fr.fli	ghtaware.com/adsb/stats/us	er/f4goh 🗉 120% 🏠 🔍	Rechercher	© ⊻ II\ 🖸 ≡	Site Configuration	×
▼ f4goh ▼ My FlightAw	/are My Alerts 🔻 My	ADS-B		03:33PM CEST	English (USA) 🗸 🔤	once configuration	
Flight/ware	All 🔻	Q Search for flight, tai	il, airport, or city	Q	Contact Us	Control Panel	
Products	Industries	ADS-B	Flight Tracking	Community	Company	Public Profile and Name	Show Username and Name
	anthony le	Cren				Site Name Precision on Coverage Map	○ Exact
	User last online: <b>15 r</b> Language: <b>English (l</b> ADS-B feeder since:	ninutes ago JSA) April 11, 2020				Receiver Location	Manually enter location
NOTE: Hourly data is repo These statistics reflect A	Edit profile picture   De orted in the site's local tin DS-B feeder sites for <b>f4g</b>	<u>lete profile picture</u> ne. Daily data is reported in ph   <u>View all FlightAware Al</u>	UTC time. D <mark>S-B Statistics   <u>View ADS-B Coverag</u></mark>	e Map	last updated a minute ago	Nearest Airport Auto-update PiAware software	Le Mans Arnage (Le Mans)
SITE 180374 L	FRM				<b>\$</b>	Mode S Multilateration (MLAT)	MLAT enabled O MLAT disabled
SITE INFORMA	TION					47.890	009, 0.2768 Edit Location
Data Feed: August 2, Joined: August 2, 202	2022		Nearest Airport: <b>Le Mane /</b> Antenna elevation above si Ground elevation: <b>246 feet</b>	<b>trnage (Le Mane) (<u>LFRM</u>)</b> aa level: <b>262 feet</b>		Outage Alerts Threshold Notify me when my ADS-B receiver is offline and comes back online	Notify after 12 hour outage
Longest Streak: 1 day	e (8/2/2022 - Now)		Location: (47.89009, 0.276	B)		Configure your ADS-B receiver alerts here	
						Device Commands Upgrade and	restart PiAware Send
						Log	C ^r <u>Refresh Log</u>

Change the geographical coordinates in the "site configuration" menu (Edit Location...).

#### This menu also has an option to remotely shut down or restart the RPI.



Back on the local RPI page <u>http://piaware/</u> or <u>http://192.168.1.145/</u>, all features are in green.



**PiAware Status** 

This is a PiAware ADS-B feeder. For more information visit flightaware.com. Below you can view information to determine if your site is functioning properly.

1090 Radio	PiAware	FlightAware	MLAT
	<b>D</b> :4	N : 70	
	PiAware Dump1090 fo Vore	Version: 7.2	
	Dump978-fa Vers	ion: dump978-fa 7.2	
	CPU Tempe	erature: 51.1 C	
	CPU L	oad: 6%	
	System Uptime	: 0 hours 7 minutes	
	View your site	statistics online.	
	Go to Sky	/Aware Map	



#### F4GOH – KF4GOH 15.6 Build the antenna

I will not describe in this document the construction of the 1090Mhz collinear antenna, but rather the URL links that allowed me to build it with coaxial cable (RG58 cable is to be avoided, too small in diameter and too much loss).

http://f4ffd.hamstation.eu/Antenne.Colineaire.ADS-B.htm

https://youtu.be/TkUYdCPFXXs

# 15.7 Adding the filter + LNA

In order to improve the reception quality, it is often necessary to add a band filter and a low noise amplifier (LNA).

I opted for a simple solution by using a ready-to-use, low-cost circuit.



The circuit must be supplied with 5V from an external source. After some modifications, it is possible to use the Bias-T integrated in the Rtl-sdr **V3**.

Simply remove the capacitor C1 and move the resistor R1 in place of C1.



We now need to activate the bias-T of the Rtl-sdr key using a few command lines with Putty in SSh.



https://www.rtl-sdr.com/getting-the-v3-bias-tee-to-activate-on-piaware-ads-b-images/

Dependencies installation:

sudo apt-get update
sudo apt install git
sudo apt install cmake
sudo apt install build-essential
sudo apt install libusb-1.0-0-dev

rtl_biast utility installation:

```
git clone https://github.com/rtlsdrblog/rtl_biast
ls
cd rtl_biast/
mkdir build
cd build/
cmake .. -DDETACH_KERNEL_DRIVER=ON
make
```

pi@piaware:~ \$ cd rtl_biast/
pi@piaware:~/rtl_biast \$ mkdir build
pi@piaware:~/rtl_biast \$ cd build/
pi@piaware:~/rtl_biast/build \$ cmakeDDETACH_KERNEL_DRIVER=ON
The C compiler identification is GNU 10.2.1
Detecting C compiler ABI info
Detecting C compiler ABI info - done
Check for working C compiler: /usr/bin/cc - skipped
Detecting C compile features
Detecting C compile features - done
Build type not specified: defaulting to release.
Extracting version information from git describe
Found PkgConfig: /usr/bin/pkg-config (found version "0.29.2")
Checking for module 'libusb-1.0'
Found libusb-1.0, version 1.0.24
Looking for libusb_handle_events_timeout_completed
Looking for libusb_handle_events_timeout_completed - found
Looking for libusb_error_name

T-bias test:

Stop reception:

### sudo service dump1090-fa stop

Activate Bias-T

```
cd src/
ls
./rtl_biast -b 1
```

Check with a **DC voltmeter** that there is a DC voltage of 5V on the Rtl-sdr SMA plug.

Restart the reception:

#### sudo service dump1090-fa start

Check reception on the local RPI page http://piaware/skyaware/

Note:

To disable Bias-T:

./rtl biast -b 0

The Bias-T must now be activated automatically when the Raspberry pi starts up:

```
sudo mkdir /etc/systemd/system/dump1090-fa.service.d
sudo nano /etc/systemd/system/dump1090-fa.service.d/bias-t.conf
```

Paste the following two lines into the nano editor:

```
[Service]
ExecStartPre=/home/pi/rtl_biast/build/src/rtl_biast -b 1
```

Pi@piaware: ~					
GNU nano 5.4 /etc/systemd/system/dump1090-fa.service.d/bias-t.conf	~				
[Service]					
ExecStartPre=/home/pi/rtl_biast/build/src/rtl_biast -b 1					
[ Read 3 lines ]					
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location					
^X Exit [∧] R Read File [∧] \ Replace [∧] U Paste [∧] J Justify [∧] Go To Line	Ŧ				

Do not forget to save ctrl+o before quitting ctrl+x.

Restart the RPI, then check the reception again.



# **15.8 Conclusion**

The solution offered by FlightAware is very practical and will delight ADS-B fans. There will be more tutorials to follow regarding the listening of airliners.