

Introduction

Why should you install a PilotAware – OGN, OGN-R rebroadcast station?

In doing so you will be helping the General Aviation Communities (Foot-launched, Gliding, Microlights and Powered Aircraft) in the UK to improve the interoperability of the various Electronic Conspicuity systems available today. These are ADSB, FLARM, PilotAware, Mode-S and ADSB. By installing an OGN-R station at your location (Club or House) you will be contributing to the ground network that will assist the interoperability between systems by up-linking situational awareness data to PilotAware equipped aircraft.

We don't expect you to do it all alone. Whilst stocks last PilotAware will provide you with the electronics (Raspberry Pi, Radio Bridge and case) free of charge for the ground based station. You will provide the rest, as described in this document, which you can do for less than £200.

An OGN-R ground based station will provide about a 30-40Km area of coverage to help aviation safety around your site. **It will also provide you with a Virtual RADAR feed that will allow your monitor to see all aircraft, ADSB, FLARM, PilotAware around the site in real time and Mode-S with a nominal MLAT delay.**

If you are already a contributor to the OGN via the gliding community, then it is even easier and cheaper. You will already have half the system and we will still give you the free stuff.

You can do everything yourself or we will do it for you at cost. ogn@pilotaware.com

Interested? Let's go!

Issue History

This document has been updated to include the addition of an additional RTLSDR receiver and antenna tuned to 1090MHz to uplink to 360 RADAR. It also includes instructions on how to install a feed to a Local Virtual RADAR Screen to Show local PilotAware, FLARM, ADSB traffic in real time and Mode-S traffic with MLAT delay.

[Table of Contents Click in the link.](#)

Introduction	1
Issue History.....	2
OGN-R PilotAware Uplink	3
What Parts are Required.....	3
Installation High Level Diagram.....	4
Installation	5
Location for the Electronics.....	5
Location for the antennas	5
Making up the Co-Axial Cables	6
Connecting the Electronics.....	6
Locating and Naming your Site	7
Location Information	7
Station Name.....	8
Downloading and installing OGN-R Software.....	9
Configuring the Software for your Specific Location.	9
Shellinbox.....	9
Possible Problems.....	11
Testing to see if Your Station is Working	12
Checking for captured real time data by opening the Ports.....	12
Using the data from the Ports to see that its working.....	12
Using a PilotAware Rosetta or Classic Unit to see that its working	13
Other Apps	13
For Advanced users	14
The disk image is operated in a safe mode, which means it cannot normally be over written	14
Updating the Software on Your OGN-R Installation	14
The PilotAware 360Radar Virtual RADAR Station.....	15
Introduction	15
Connecting to PilotAware Radar360 Virtual RADAR	15
Addendum	17
Parts Required to build an OGN-R uplink.....	17

OGN-R PilotAware Uplink

Thank you for helping expand the OGN-R Network to provide additional safety for powered aircraft and gliders alike by up-linking FLARM and Mode-S equipped aircraft co-ordinates to PilotAware equipped aircraft.

To help you with the costs of upgrading or installing a new OGN-R uplink, PilotAware Ltd will, whilst stocks last, provide a Raspberry Pi 2B computer, PilotAware Radio Bridge and Case **FREE OF CHARGE**. This is available to supporters who want to increase the OGN-R network both in the UK and mainland Europe. In addition, if required, PilotAware will load and configure the software to make it even easier for you. If you want to know more contact us at <mailto:OGN@pilotaware.com> and apply for your free stuff.

Installing and maintaining an OGN-R antenna does not require a high level of technical knowledge. The OGN-R is a technical innovation but the highly technical parts do not need to be understood by the installer or host. Step by step instructions are provided. We will of course be available on line to help. Most of all, you will be making history and its fun.

What Parts are Required

1. A Raspberry Pi Single Board Computer (Pi 2B) Provided Free of Charge
2. A PilotAware Radio Bridge Provided Free of Charge
3. A Case Provided Free of Charge
4. An SD Memory Card
5. An RTLSDR software defined Radio tuned to pick up FLARM signals
6. A second RTLSDR software defined Radio if the 1090MHz antenna is fitted as recommended for Mode-S and ADSB data collection.
7. A Raspberry Pi Mains-to 5.2V 2.1A power supply
8. A simple mechanical timer
9. An Ethernet cable to connect to your existing router
10. Coaxial cable to connect the antennas to the electronics.
11. Pigtails to connect to the RTL-SDR.
12. Antenna mounts to support the antennas
13. 2 or 3 External antennas

1. The PilotAware Antenna. This is used to **transmit and receive data** to aircraft fitted with PilotAware units operating at **869.5MHz**. The PilotAware antenna is connected to the PilotAware Radio Bridge and Raspberry Pi via a co-axial cable and an SMA connector.

2. The OGN Antenna. This is used to **receive** FLARM signals that are transmitted at 868MHz from FLARM or OGN tracker equipped gliders and aircraft. **The feed from the OGN FLARM 868Mhz antenna, must be connected via a software defined receiver (SDR) to the top left USB slot on the raspberry Pi unit with the Ethernet socket to the left.**

Building and installing an OGN-PilotAware Uplink to detect and retransmit glider locations
 March 2019.

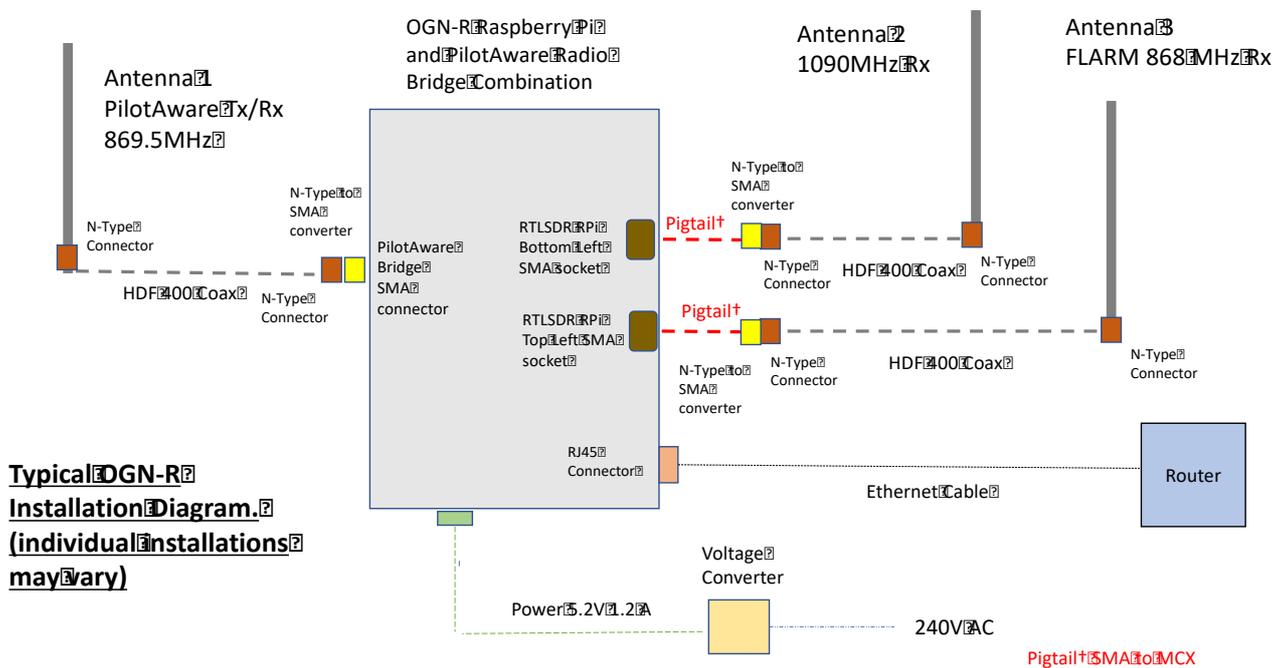
3. The 1090MHz Antenna† From, January 2019, it is recommended a third 1090MHz **receive only** antenna be added to the OGN-R station. This is not absolutely necessary but has the following advantages. When provided, all data received can be uplifted to 360RADAR to contribute to their network and provide Mode-S data for use in PilotAware Mode-S/3D reception. All data collected can be used to provide a feed for a local Virtual RADAR screen which will show local PilotAware, FLARM, ADSB traffic in real time and Mode-S traffic with MLAT delay.

*The feed from the 1090 antenna, **must be connected via a software defined receiver (SDR) to the bottom left USB slot on the raspberry Pi unit with the Ethernet socket to the left.***

†Note. An external 1090MHz antenna or an internal 1090MHz antenna can be used as convenient. (obviously external is best but the 1090MHz signal is very strong so an internal antenna may work at your location). Both types are described in the parts list at the end of this document

A list of equipment and suppliers is available at the end of this document any queries <mailto:OGN@pilotaware.com>.

Installation High Level Diagram



Typical OGN-R Installation Diagram (individual installations may vary)

The above diagram is provided as a visualisation of the hardware installation which can be modified for your specific installation.

Installation

The installation consists of

1. Selecting a dry location for the electronics with access to 240V and Internet. †
1. Installing the external antennas at a suitable location.
2. Making up and running low loss coaxial cable from the antennas to the electronics.
3. Connecting the parts together
4. Configuring the software for the specific site.
5. Power up and test.

Location for the Electronics

- The location for the electronics should be as close to the antennas as practically possible. As short a distance as possible is preferred but up to 10 metres is OK. This is to minimise the losses in the Co-Axial cable. *Note up to 16 metres has been shown to work using the recommended HDF 400 coaxial cable.*
- Mains power is required within 2 metres of the Raspberry Pi for the Raspberry Pi mains to 5.2v 1.2A dc/dc converter.
- The mains power supply to the Raspberry Pi power converter should be via a switched mechanical timer set to turn the power off from 23.00 to 04.00 daily. (Please choose a random time around 0400) This will ensure a timely daily reboot of the system. From January 2019, the OGN-R software includes an automatic check for and download of available new software. *Be aware that if you suffer regular power failures the timing of the mechanical timer will drift by the time of the power outage so a periodic check on the timers is advisable.*
- An Ethernet cable is required to connect the Raspberry Pi to the router. This can generally be as long as required.
- *If the installation is a long way from the router, then the LAN can be extended over the mains using a power line carrier device such as **devolo** which has been used successfully on several locations. <https://www.devolo.co.uk>*

Location for the antennas

- The antennas should be positioned vertically and as high as possible avoiding obstacles that would get in the way of transmission and reception. The antennas should be a minimum 2 feet apart. Further away the better. Only the PilotAware antenna is transmitting. (It transmits at 869.5MHz so will NOT affect VHF voice antennas)
- Each and every installation will be bespoke. A wide variety of antenna mounts are commercially available from Screw fix, Tool Station and other suppliers in the UK. A list of typical mounts is supplied at the end of these instructions.
- The recommended antennas come supplied with Female N-Type connectors.

Making up the Co-Axial Cables

- HDF 400 (double shielded low loss coaxial cable) or equivalent and N-Type connectors should be used for all antennas for maximum efficiency. Although a smaller cable like RG8X can be used for short reaches.
- HDF400 cable is fairly thick and will require a suitable Crimp tool to make off the connectors. If you are just doing the one installation, it may be cheaper to have these cables made up commercially. A crimp tool is about £15.
- One Male and One Female N-Type connector is required for each cable.
- The Male N-type connector on the Co-Axial cable should be offered to the Female N-Type connector on the antenna and the connectors screwed firmly together. The joint should be weather-proofed using self-amalgamating tape.
- This should be repeated for the second cable
- The Co-Axial cables should then be dressed to the location of the electronics which should be as close as practically possible. (Take care that you know which cable goes to which antenna by labelling the loose ends.)

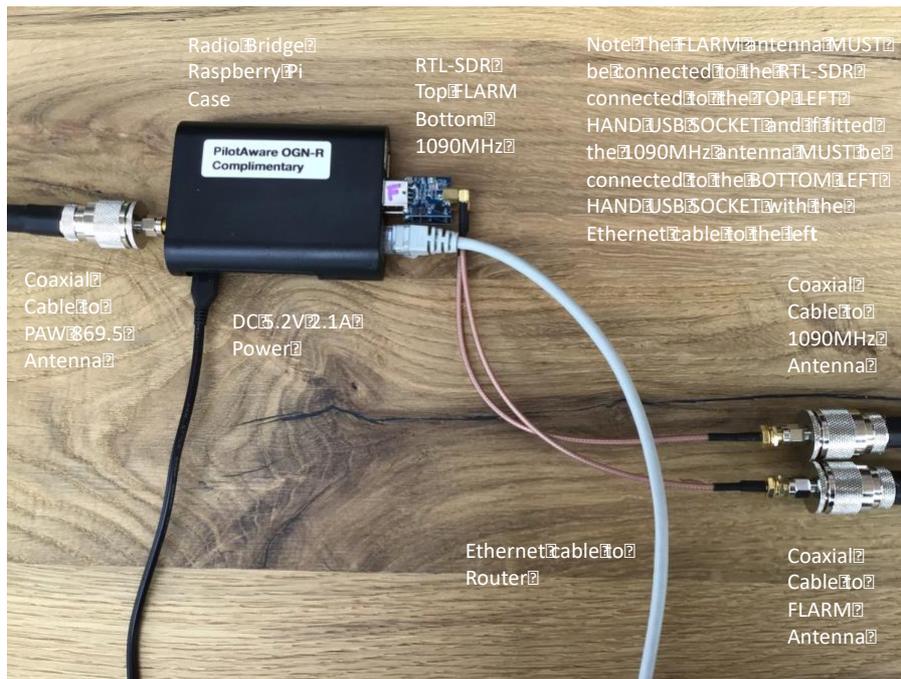
Connecting the Electronics

A good tip is to mount the electronic onto a small wall board or box to secure the units without putting stress onto the components or cables. The cables can then be secured with cleats.

The electronics are connected to the following interfaces. (*The following diagram is typical only and will vary between installations*)

1. An N Type to SMA Converter is screwed firmly into the Female N-Type connector of each Coaxial cable.
2. The coaxial cable connected to the P3i Antenna (shown on the left of the following diagram) is connected firmly to the SMA connector on the PilotAware Bridge.
3. The Coaxial cable connected to the **FLARM Antenna** is connected to an RTLSDR via a pigtail of necessary, and **must be connected to the Top Left USB socket on the raspberry Pi unit with the Ethernet socket to the left.**
4. If connected, the coaxial cable connected to the 1090MHz Antenna is connected firmly to the second SMA via a pigtail if necessary and **must be connected to the Bottom Left USB slot on the raspberry Pi unit with the Ethernet socket to the left.**
5. The Ethernet cable is connected to the Ethernet port of the Raspberry Pi, with the other end connected to a free port on the local router.
6. The Raspberry Pi power supply is connected to the mains supply via the mechanical timer set to provide power between 04.00 and 23.00 hrs.
7. DO NOT AT THIS POINT TURN THE POWER ON.
8. Make sure that the complete set up is located firmly and that there is no bending moments on any of the components especially the NESDR SMART RTLSDR or second RTLSDR if fitted.
9. Cable cleats and other fixtures should be used to affect a neat installation.
10. The hardware is now set up.

Building and installing an OGN-PilotAware Uplink to detect and retransmit glider locations March 2019.



†Note the above picture uses low power RTLSDR dongles available from PilotAware as these fit the available space. Others may be used if suitable.

Locating and Naming your Site

Before downloading and configuring the OGN-R software, specific information is required about your site. These are:

1. The Location
2. The Name

Location Information

You will need to have the unique location information for your station to hand.

This information can be obtained by going to <http://schellenberg.nl/ogn/index-latlon.html> on your computer.

When the program opens, (usually at a location in Europe) drag the red marker to the desired position of your OGN-R installation and you will be given the required latitude, longitude and the height AMSL in metres and Geoidsepar. Only use the 6 digits following the decimal point for the latitude and longitude and remember that the longitude **will be -ve. West of Greenwich**. To get the Geoidsepar click the link button and use the **EMG84** value. Make a note of these values for use in configuring the software for your specific location. A matrix is provided for this on the next page.

It will look something like this. (although since google maps went commercial it will be darker). You will also have to use your smartphone to get the height above sea level in metres.

Building and installing an OGN-PilotAware Uplink to detect and retransmit glider locations
 March 2019.

OGN - Receiver Location Settings

Drag the red marker to the desired position!



Latitude:

Longitude:

Altitude (m): (+ antenna height ;-)

GeoidSepar (EGM2008) [Link](#)

Station Name

The Open Glider Network maintains a naming convention for all sites. Please see the rules at this link on the OGN website. <http://wiki.glidernet.org/receiver-naming-convention>

However please keep your station name to a maximum of 7 characters. If it is an airfield it is conventional to give its ICAO code such as EGBW for the example of Wellesbourne. When you have configured your software, this name will then be automatically prefixed with PW ie PWEGBW. **(YOU DO NOT NEED TO START YOUR SITE NAME WITH PW)**

You can record your unique configuration here.

Item Required	Description	Record Here
Host Name	Don't change this unless you are competent	OGNPAW
Station Name	See naming Rules above	
New Password	A new station password can be input to replace the generic one. Note if you forget the password it CANNOT be retrieved.	
Latitude	6 digits following the decimal point.	
Longitude	6 digits following the decimal point.	
Altitude	Metres AMSL	
Geoidsepar	Metres using EMG 64	

Downloading and installing OGN-R Software.

To make the installation as easy as possible new software has been produced that steps you through the installation process.

1. Download the latest disk image for the combined OGN/PAW software from <http://pilotaware.lode.co.uk/downloads/OGN/PilotAware-OGN.latest.zip>
2. This will download a zip file with a name similar to ***PilotAware-OGN.201902203*** into the downloads folder of your computer. The numbers after the '.' Indicate the version date.
3. Place all ***the individual unzipped contents of this file (not the folder)*** into the formatted Micro SD Card. This may require the use of an SD card holder to fit the Micro SD card into the SD slot on your computer. If you don't have one, we will send you one. ogn@pilotaware.com
4. **The root** of the SD card should contain the following folders
 - defaults
 - os
 - overlaysand many other files.
5. When you have downloaded all the files, eject the card from your computer and load the SD card into the Raspberry Pi, power up and **leave for about 20 minutes** to allow the files to unpack and self-configure.
6. There will be a permanent red light (Power) and a flashing green light (Disc access) on the raspberry pi as this operation is proceeding. **DO NOT INTERRUPT THE POWER SUPPLY AS THIS WILL CORRUPT THE SOFTWARE.**
7. You can watch the unpacking progress by attaching a TV or a monitor to the Pi via an HDMI cable. When it has finished the prompt, 'pi' will be seen. The software has now downloaded and unpacked successfully.

Configuring the Software for your Specific Location.

Shellinabox

The OGN-R software has been developed to make the installation as simple as possible. There are 3 ways to connect to the software to configure the program for your unique location.

1. The most direct way to input the required data is to connect a monitor and keyboard to the Pi. This is done by connecting the Monitor to the HDMI port and the keyboard to any USB port.
2. Alternatively **connect a computer to the IP address allocated locally by your router** to your OGN-R unit. This can be done by wired Ethernet or WiFi connection to the same router. This is usually done by typing in 192.168.0.1 to gain access your local router although this may differ so please consult your router documentation. Once

Building and installing an OGN-PilotAware Uplink to detect and retransmit glider locations
March 2019.

connected to your router you need to locate the IP address allocated to the Raspberry Pi of the OGN-R. To get the actual IP address allocated to the Raspberry Pi you may have to use an advanced menu that is password protected. See your local router instructions. For example, a UK Sky network router generic log in is 'admin' and the password is 'sky'. Others will differ. Then choose LAN IP Set Up. For example, if the IP address allocated for your unit with the default hostname 'ognpaw' is 192.168.0.200 then you will connect via 192.168.0.20:4200. The allocated address (in this case 192.168.0.20) will vary from router to router.

*Also, please note if the router is powered down it **may** allocate a different IP address. This is called dynamic IP allocation. This can be overcome by giving the OGN-R a fixed IP address.*

3. Additionally, the **OGN-R** software has been developed so that you can run a shell from within a web browser. Google Chrome or Firefox is recommended. When connected on the same network as the Pi, navigate to **https://ognpaw.local:4200/** You will probably get a prompt to say that this is insecure - ignore this and continue to the address. Not all routers allow you to do this as they do not resolve the IP address to the default host name of ognpaw.local.

With each connection type, when connected correctly, you will see the following prompts. Your response is the characters in red

```
login: pi
password: 12345678 (This is the default Password you can change it later if you wish)
pi@ognpaw: $ cd rtlcdr-ogn (this changes the directory to where the required files are)
pi@ognpaw: /rtlsdr-ogn ./PilotAware-OGN.config.sh (this runs the configuration program)
Note please make sure that the syntax is correct if it is not you will be prompted that there is an error
```

You may get the message sudo: unable to resolve host ognpaw – ignore this. wait a while and if the RTLSDR's are connected you will see Found 1 SDR's. or possibly Found 2 SDR's

The screen will look something like this

```
(15:18:48) FILESYS : Mount RW
```

```
Stopping Services
```

```
Do not plug in or remove any SDR dongles whilst this configuration script is running.
```

```
It is strongly advised to have the SDR's plugged in and then reboot the Pi before running this configuration script.
```

```
Found 2 SDR's:
```

```
Raspberry Pi 2 Model B Rev 1.1
```

```
USB Port Top Left : dongle ID=1 and is currently allocated to OGN/FLARM reception on 868Mhz
```

```
USB Port Bottom Left : dongle ID=0 and is currently allocated to ADS-B reception on 1090Mhz
```

```
USB Port Top Right : SDR detected
```

```
USB Port Bottom Right: SDR detected
```

```
1 dongle is currently configured for OGN and the other is configured for ADS-B reception
```

```
Do you wish to change the dongle configuration [y/n]:
```

Building and installing an OGN-PilotAware Uplink to detect and retransmit glider locations March 2019.

Check that the dongles are in the right place (*FLARM in top left and 1090MHz in bottom left with the Ethernet cable to the left*) then answer **(n)**

Now continue to follow the instructions. You will be prompted to provide a new **Password** please do this so no one else can hack your system – they will. Record your password, it can't be recovered other than a complete new reinstall.

You will be prompted to change the host name from (ognpaw). Do not change this unless absolutely necessary so answer **(n)**

You will be prompted to provide a new **Name** for your ground station (Currently this is set at Coventry. Answer **(y)** and replace it with in your chosen name 7 letters max).

You may have seen that OGN uplinks are prefixed with PW i.e. PWEBGW. You do **NOT** need to prefix your name with PW this is done automatically.

The program will require you to input the Latitude, Longitude, Altitude, Height AMSL and Geoid of your location.

Using the values gained previously from the Schellenberg app and recorded above,

Provide Station **Latitude** (change default value to the value of your station) Return

Provide Station **Longitude** (change default value to the value of your station). Return

Provide Station **Height AMSL** (change default value to the value of your station). Return

Provide **Geoid** (change default value to the value of your station) Return

The software will then install and calibrate the RTLSDR FLARM radio receiver.

This will take about 90 seconds and it will step through 0dB to 50dB.

If all is well a banner will then be shown with your configuration as shown below.

Following this and after up to 10 minutes to connect to the server it will show Starting Services. The OGN-R station is now up and running.

```
##### Summary #####
Station Name is      : pawtest1
Station Latitude is  : 52.217521
Station Longitude is : -1.758672
Station Altitude AMSL [M] is : 69
Station Altitude GEOID [M] is : 50.5038
Station SDR PPM is   : 0
Station SDR Gain is  : 45
Station SDR Freq Centr is : 923.400
##### Summary #####

Starting Services
^[[
```

[pi@ognpaw:~/rtlsdr-ogn](#)

Possible Problems

- If the SW cannot see the FLARM antenna through the RTLSDR the calibration steps through very quickly, This, means that there is no physical connection from the RTLSDR dongle to the FLARM antenna. Suspect the co-axial cable, pigtail or RTLSDR connection. Make sure all connections are secure and that the inner pins of the coaxial cable connectors are mating properly. If you have an SWR meter available the impedance should be 40-60 ohms and the SWR between 1 and 2
- The calibration routine searches for GSM signals for the antenna and RTLSDR calibration. Therefore, you may have difficulty in capturing data in low GSM signal strength areas. So long as some data is collected this is OK.

Building and installing an OGN-PilotAware Uplink to detect and retransmit glider locations March 2019.

- c) If after a successful calibration the program states that it cannot “start service”, this may be that it cannot get through the router to the internet and hence to the OGN servers. If this is the case suspect your router or internet connection.

When connected to the OGN servers via the internet, it can take up to 10 minutes for the station to appear on the OGN map <http://ognrange.unseen.org>

Testing to see if Your Station is Working

Once your station has registered with the OGN servers it will be displayed on the OGN map. To check this, connect to the internet and navigate to <http://ognrange.unseen.org>

When connected, you can locate your site type in PW*Name* (where *Name* is the first 7 digits of your OGN-R Station Name), into the Box “Showing All Choose”. Navigate to the approximate area in Europe where your station is located and your site should show up on the map. As the days’ progress, you will see all of the targets that you have captured build. Choosing PW*Name*, will show the PilotAware units captured and *Name* (without PW at the Front) will show the FLARM units captured. Capturing targets at 30Km+ for PW*Name* and 60Km+ for *Name* is normal. Unless you are on a geographic flat plane this will not be symmetrical due to local obstructions etc. It will take several weeks to capture enough data to determine the range of your station.

Checking for captured real time data by opening the Ports

Ports can be opened for diagnostics and to check that the installation is working. Whilst connected to the same network as the pi using a modern browser such as Chrome or Safari type in.

<http://ognpaw.local> (Note port :80 is assumed but can be included if you want i.e.

<http://ognpaw.local:80>)

<http://ognpaw.local:8080>

<http://ognpaw.local:8081>

Note that this starts http not https 😊

Alternatively using the wired connection as in 2 above

192.168.0.*n*:80 (where *n* is specific to your network)

192.168.0.*n*:8080 (where *n* is specific to your network)

192.168.0.*n*:8081 (where *n* is specific to your network)

Using the data from the Ports to see that its working

1. **Port 8081** will show to which APRS Sever you are connected.
2. **Port 80** will show PAW, FLARM targets and MLAT upload
3. The output of Port 80 looks like this

Building and installing an OGN-PilotAware Uplink to detect and retransmit glider locations
March 2019.

Version 20190327 : Date 2019-03-31 15:35:01 : Station PWWilmcot
P3I(data)=464 MLAT=OK Internet=Connected Radar Login

ICAO	Type	Age	Amb (RND/ACT)	GS (KN)	Dist (KM)	Alt (FT)	Uplink
DDBBC3	O--	-	-	20	2.7	2493	(39.32km,+1279ft)F56F35
405A8C	--M	8	0.30/0.29 NM	132	5.7	3400	(44.84km,+2183ft)F56F35
43EA40	--M	4	0.30/0.21 NM	192	8.2	8725	(37.61km,+7508ft)F56F35
4013A5	--M	7	0.30/0.15 NM	78	33.6	1700	(54.28km,+483ft)F56F35
407074	--M	5	0.30/0.13 NM	95	34.5	1600	-
400976	--M	5	0.30/0.20 NM	145	35.1	1575	-
F56F35	-P-	-	-	39	39.2	1227	-
404083	--M	13	0.30/0.22 NM	61	48.3	1900	(32.13km,+683ft)F56F35
40697E	--M	5	0.30/0.15 NM	110	49.2	2700	(16.01km,+1483ft)F56F35
402B07	--M	6	0.30/0.18 NM	111	49.4	2675	(25.96km,+1458ft)F56F35
400DC7	--M	7	0.50/0.32 NM	166	51.3	3700	-
A0A728	--M	10	0.50/0.36 NM	130	53.6	1700	(55.71km,+483ft)F56F35

The instantaneous, cumulative number and type of aircraft detected will be recorded

Key	
OK	Number of confirmed targets recorded.
NG	Targets Rejected due to not meeting defined requirements.
ICAO	The ICAO of the aircraft being detected
Type	Ogn - PilotAware - MLAT
Age*	Age of MLAT data in seconds
AMB*	RND = Rounded ACT = Actual
Distance (KM)	Distance from the OGN-R station
Altitude	Altitude in feet.
Uplink	What is triggering the uplink.

- Only provided in the UK in Mode-S/3D trial areas

[Using a PilotAware Rosetta or Classic Unit to see that its working](#)

To check that the OGN-R station is working, power up a PilotAware unit in the immediate location and you should see:

1. The OGN-R station will be recorded in the top right hand of the PilotAware RADAR Screen.
2. The OGN-R station will be shown as an ICON in the centre of the RADAR screen.
3. The OGN-R station will appear in the list in the Rosetta Traffic Page
4. The PilotAware with ICAO number, Altitude and Distance will be recorded on port 80
5. FLARM equipped targets will be shown on PilotAware RADAR and also on EasyVFR SkyDemon etc. if the Flight Bag is connected.

[Other Apps](#)

Building and installing an OGN-PilotAware Uplink to detect and retransmit glider locations
March 2019.

There are several Apps that can be used to show historical and real time data from your OGN-R site. On each site zoom into your local area and check your site progress.

The Open Glider Network at <http://ognrange.onglide.com>
Spot the Gliders at <http://live.glidernet.org>

Advice is also available at forum.pilotaware.com

For Advanced users

The disk image is operated in a safe mode, which means it cannot normally be over written
In order to gain write access type.

```
$ sudo /root/mount rw.bash
```

To write protect type.

```
$ sudo /root/mount ro.bash
```

The software is running as a service to start/stop the service

```
$ sudo service rtlcdr-ogn stop
```

```
$ sudo service rtlcdr-ogn start
```

Updating the Software on Your OGN-R Installation

Note if a full manual loading and configuration of software dated 20190220 or later is used then software and operating system updating is done automatically.

If, however you have an earlier version the software can be updated by running the update script as follows.

```
pi@ognpaw:~ $ cd rtlcdr-ogn
```

```
pi@ognpaw:~/rtlsdr-ogn $
```

```
pi@ognpaw:~/rtlsdr-ogn $ ./PilotAware-OGN.update.sh
```

It is however recommended that you undertake a full software update if the software revision is earlier than 20190210.

The PilotAware 360Radar Virtual RADAR Station.

Introduction

If you have installed all 3 antennas PilotAware, FLARM and 1090MHz then you will be able to use a browser equipped computer or tablet to drive a Virtual RADAR display for your clubhouse or any other location. This display can be a computer itself, a monitor or large TV.

The PilotAware 360Radar Virtual RADAR **station is for entertainment only and cannot be used for air traffic control or any form of guidance.** PilotAware 360 Radar, will give you real time data (no delay) of all PilotAware, FLARM and ADSB equipped aircraft in your region. This will be typically 30-60Km for PilotAware and FLARM equipped aircraft and 40- 100Km for ADSB equipped aircraft depending on height. In addition, Mode-S aircraft that are being interrogated by Secondary Surveillance Radar (SSR) will also be shown on the screen with the normal limitations of multilateration (MLAT).

To gain access to PilotAware 360Radar Virtual Radar you will need to have OGN-R software revision 20190210 or later. If you have software that is earlier than this, you will need to undertake a full manual software download in to ensure that the correct Operating System is being used.

Connecting to PilotAware Radar360 Virtual RADAR

- If you have maintained the recommended hostname of ognpaw, Using a modern Browser Safari, Chrome, Firefox etc connect to the same local network (LAN) as the ground station and in the browser search bar type in ognpaw.local. You should get a screen that looks something like the following screenshot. There may be more rows indicating more local MLAT aircraft but this is not important.

(Note if your router or cable modem does not resolve ognpaw.local to the IP address allocated to the host ognpaw then you will have to type in the allocated IP address followed by port 80. This will be something like 192.168.0.40:80. Of course the 192.168.0.40 bit will be specific to your router and will be different. Log into your router admin to find out what it is.)

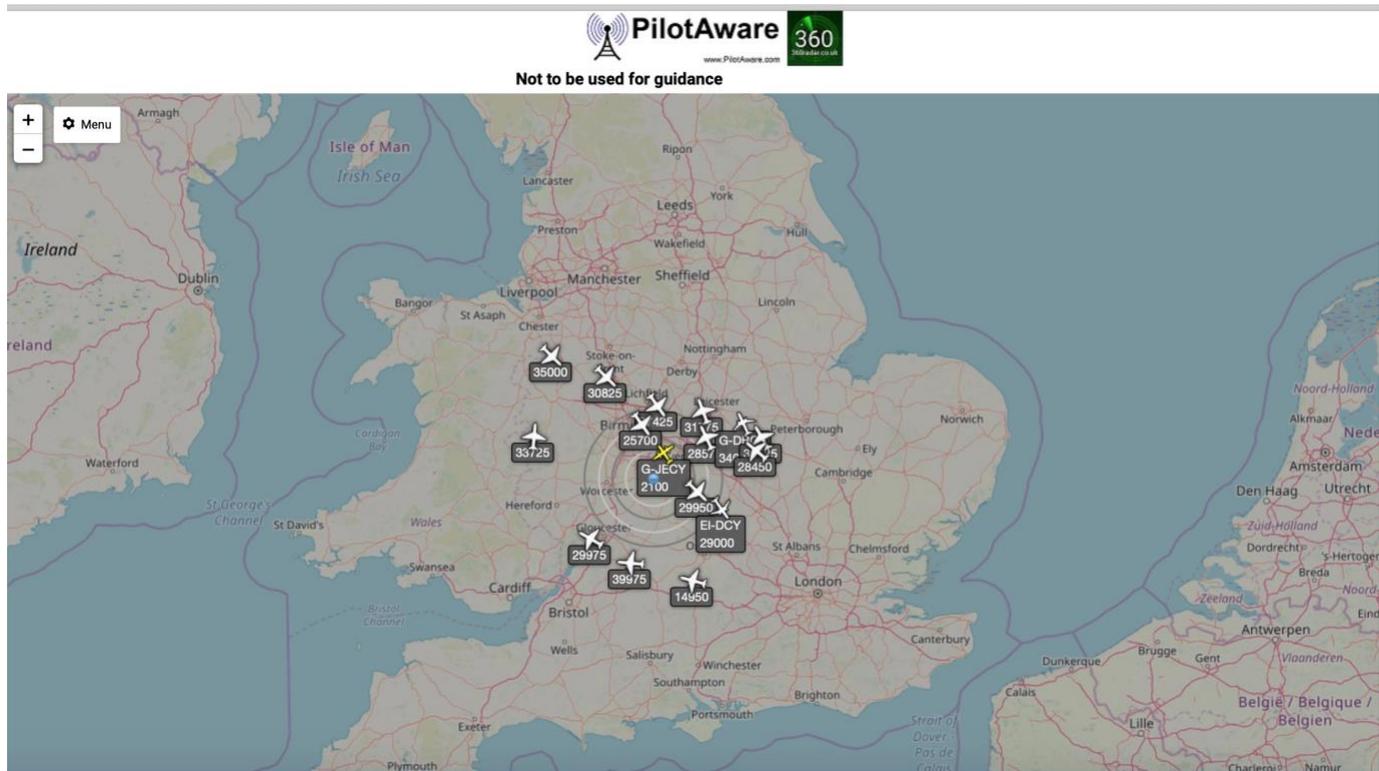
**Version 20190315 : Date 2019-03-17 17:55:35 : Station PWilmcot
P3I(data)=26363 MLAT=OK Internet=Connected [Radar Login](#)**

ICAO	Type	Age	Amb (RND/ACT)	GS (KN)	Dist (KM)	Alt (FT)	Uplink
D794E2	-P-	-	-	0	0.0	246	-
405EF5	OPM	4	0.50/0.30 NM	271	23.4	-	-
404781	OPM	4	0.30/0.16 NM	141	58.6	-	-

On the second row, a URL entitled [Radar](#) will be seen. Click on this to activate PilotAware 360 Radar Virtual RADAR.

Building and installing an OGN-PilotAware Uplink to detect and retransmit glider locations March 2019.

After about 10 – 20 seconds, a screen resembling this will appear.



At the top left corner, there is a menu which when activated allows configuration of the screen. The menu has several options.

It is not intended to go through each menu here as they are self-explanatory. However, at the high level they are:

General

This allows the user to configure the centre of the map on your current or other location and choose the units for the heights speeds etc.

Map

Allows the user to apply distance rings choose colours etc

Aircraft

This allows a multitude of parameters to be set for the target aircraft detected.

List

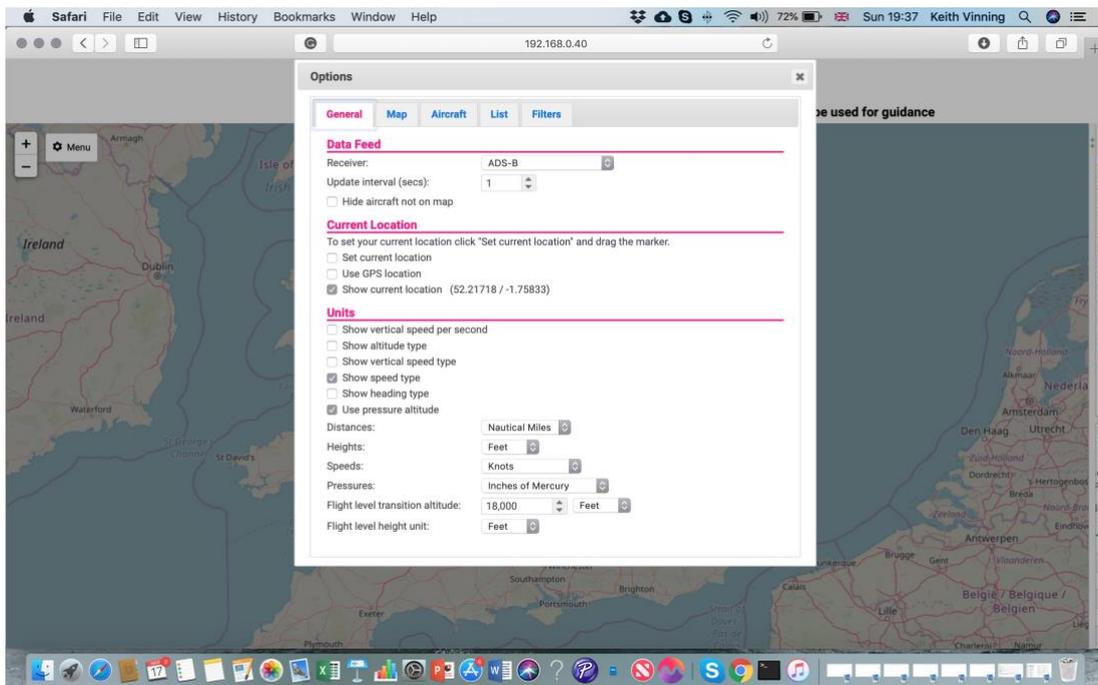
This allows the aircraft list to be configured

Filters

The filters page allows the user to generate a range of filters for customising the display.

Full operating instructions are available at as
<http://www.virtualradarserver.co.uk>

Building and installing an OGN-PilotAware Uplink to detect and retransmit glider locations March 2019.



Please remember as good as PilotAware VRS is this must not currently be used for air traffic management, control or guidance.

Addendum

Parts Required to build an OGN-R uplink

The parts below are recommended and do not include delivery

Part	Supplier
Raspberry Pi 2B	Free of Charge
P3i Radio Bridge	Free of Charge
Case	Free of Charge
RTLSDR 2 required (1) for FLARM (2) for 1090	These are available from PilotAware or https://www.rtl-sdr.com/product/stratux-rtl-sdr-low-power-rtl-sdr-limited-stock-only/
Pigtail SMA-MCX 2 required	These are available from PilotAware or https://www.amazon.co.uk/SMA-MCX-Tengko-Pigtail-Assembly/dp/B072FKY8SH/ref=asc_df_B072FKY8SH/?tag=googshopuk-21&linkCode=df0&hvadid=234898670137&hvpos=1o1&hvnetw=g&hvrnd=10520524449277902465&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9045553&hvtargid=pla-423200461596&psc=1
CoAx Cable	https://www.wifi-antennas.co.uk/hdf400-coaxial-cable-per-metre.html
N-Type connector Male 3 required	https://www.wifi-antennas.co.uk/n-type-male-crimp-connector-hdf400.html
N-Type Connector Female 3 required	https://www.wifi-antennas.co.uk/n-type-female-crimp-connector-hdf400.html

Building and installing an OGN-PilotAware Uplink to detect and retransmit glider locations
March 2019.

N-type Male to SMA converter 3 required	https://www.wifi-antennas.co.uk/sma-male-to-n-type-male-adaptor.html
HDF 400 Crimp tool	https://www.wifi-antennas.co.uk/catalogsearch/result/?q=crimp+tool+HDF+400
SD Card	https://www.amazon.co.uk/SanDisk-Standard-Memory-Label-Change/dp/B000UZLOYU/ref=sr_1_3?ie=UTF8&qid=1533245433&sr=8-3&keywords=8gb+sd+cards
RPi Charger	https://www.amazon.co.uk/Raspberry-Pi-Power-adapter-UK/dp/B01CCR5P8U/ref=sr_1_5?s=computers&ie=UTF8&qid=1533245620&sr=1-5&keywords=Raspberry+Pi+charger
Ethernet cable	https://www.amazon.co.uk/CSL-Ethernet-Gigabit-1000Mbit-compatible/dp/B00J3UYNII/ref=sr_1_6?s=computers&ie=UTF8&qid=1533245968&sr=1-6&keywords=Ethernet+cable
Mechanical timer	https://www.amazon.co.uk/PowerMaster-438242-Plug-Mechanical-Timer/dp/B007OUQB48/ref=sr_1_29?ie=UTF8&qid=1533246329&sr=8-29&keywords=mechanical+timer
FLARM Antenna	ogn@pilotaware.com or https://fjhuahong.manufacturer.globalsources.com/si/6008806990472/pdtl/Omni-antenna/1130137384/868MHz-9dBi-omni-base-antenna-fiberglass-antenna-N.htm
PilotAware Antenna	ogn@pilotaware.com or https://fjhuahong.manufacturer.globalsources.com/si/6008806990472/pdtl/Omni-antenna/1130172675/868MHz-7-dBi-Omni-Antenna-fiberglass-antenna-N-F.htm
1090Mhz antenna	ogn@pilotaware.com or https://fjhuahong.manufacturer.globalsources.com/si/6008806990472/pdtl/Omni-antenna/1130172675/1090MHz-7-dBi-Omni-Antenna-fiberglass-antenna-N-F.htm

There are several inexpensive commercially available antennae mounts available here are just a few examples. Others are available on line to meet your specific application.

https://www.screwfix.com/p/labgear-tv-aerial-stand-off-bracket-9-90874?tc=HB3&ds_kid=92700024374092992&ds_rl=1248154&ds_rl=1245250&ds_rl=1247848&gclid=Cj0KCKiAw9nUBRCTARIsAG11eic35MmxwVB1JF2d8v2ONaZ0cGs15INBii4W0G6m0JDnaeCaNCIDrSYaAqukEALw_wcB&gclsrc=aw.ds&dclid=ClmVw422ydkCFY6u7QodGIIc5w

<https://www.screwfix.com/p/labgear-29935lab-tv-l-cranked-mast/21470>

<https://www.toolstation.com/shop/Electrical/d190/TV+%26+Satellite/sd3084/TV+Aerial+%26+Satellite+Dish+Pole/p39913>

<https://www.toolstation.com/shop/p69098>

<https://www.wifi-antennas.co.uk/antenna-wall-mount-kit-with-z-bend-stand-off.html>

<https://www.screwfix.com/p/labgear-29924lab-3m-aerial-mast/32094>

Building and installing an OGN-PilotAware Uplink to detect and retransmit glider locations
March 2019.

If you need further information ogn@pilotaware.com

End of Document