

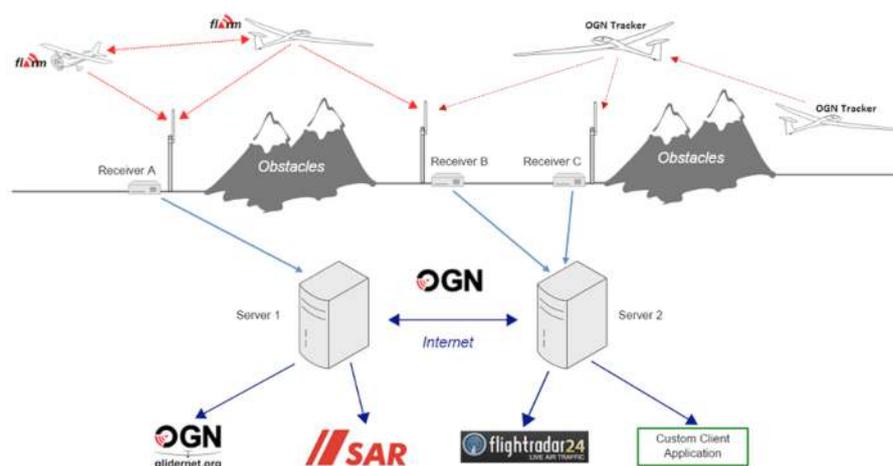
What is the OGN-R and Why You Should Help.

Introduction

Following a tragic, mid-air, fatal accident close to Husbands Bosworth between a FLARM equipped glider flown by a very experienced instructor and a light aircraft there has been a groundswell of requests to the PilotAware™ Team to provide help in making gliders more visible to its users.

FLARM™ is a very well respected system used by gliders, worldwide which contains algorithms that can, by interacting with other FLARM™ units, in close proximity, predict a collision. To help pilots who wanted to **see and be seen** by gliders close up, PilotAware™ integrated the FLARM™ Mouse, which is available at just over £800 from several UK suppliers. However, something needed to be done to help those pilots that were not able or did not want to use this route to be able to see gliders from afar and hence keep well away which seems a reasonable thing to do.

One organisation providing information on the location of gliders is the **Open Glider Network (OGN)**. Using volunteers, mainly from the gliding community, the OGN has built a Europe-wide interconnecting network of high gain receivers that monitors the location of FLARM and OGN equipped gliders from up to a 60Km radius from the antenna. This is done, not to use the predictive algorithms but, to see where the gliders are for information, competitions, search and rescue and safety improvement purposes. The information gathered is collated together and presented for all to see. For example, a website that uses this information is <http://live.glidernet.org>.



The Problem

So, to see and avoid gliders, why can't we just take an OGN or Flight Radar 24 feed from the internet and link it to PilotAware™ over the 3G/4G mobile network(s) and then see where gliders are? Sounds like a good idea? Well unfortunately it's not that simple.

- (i) There is a lot of latency (delay) from the instant that a FLARM/OGN equipped glider transmits information to when it's presented on your iPad over the mobile network. This is due to the time taken for the information to be transmitted from the antenna to the OGN servers and back again through the internet and mobile network and then to your device. Whilst this is fast in relative terms, the glider will not be shown where it was when the signal was first sent.
- (ii) The mobile network is famously unreliable in the air for a host of security, political and technical reasons.

Additionally, in order to optimize the bandwidth available to the OGN Network receivers, not all received traffic samples are sent immediately upon reception. Instead they are collated and fed into the network on pre-determined intervals which could be related to time, change of position, or both. So, using the 3/4G network(s) is not a safe viable option.

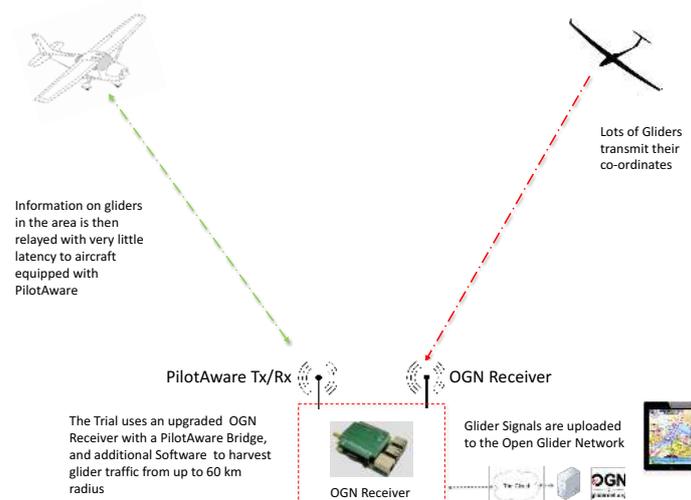
The Solution

To overcome these problems, after a lot of work the PilotAware™ Team came up with a revolutionary plan. The initial solution was known as ‘The Midlands Trial’ and it worked like this;

Four existing OGN stations were enhanced at Bidford, Shennington, Husbands Bosworth, and Stoke (Corby) and a brand new enhanced OGN station was been installed at Wellesbourne Mountford Airfield EGBW.

The enhancement includes the addition of a PilotAware Radio Bridge and transceiving ground antenna linked to the OGN receiver through some new software. With this configuration, GPS information showing the position of gliders, within a distance of up to 60Kms from the OGN receiver, is harvested by the PilotAware ground station and uplinked (re-broadcast) on the PilotAware frequency of 869.5MHz. As the data is taken at the OGN receiver source, there is minimal latency (delay) and, as we are using the PilotAware frequency, the transmission uplink is reliable. The very low latency was verified by equipping an aircraft with both FLARM and PilotAware systems, and watching the round-trip delay from aircraft to ground, then ground to aircraft. There was no visible delay as the transmissions are virtually at the speed of light. The result was that both aircraft were shown ‘piggy-backed’ in the display. The trial was a great success.

The biggest bonus with the solution is that there is no change required to the existing PilotAware units used in the aircraft. If you have PilotAware fitted and you fly into an area supported by the uplinks, then you will see the local gliders if they are using FLARM or OGN Trackers. These gliders will be transmitting GPS coordinates, therefore they will be displayed on PilotAware RADAR or on your navigational software just like ADSB, FLARM or PilotAware targets. You will also get voice alerts. See the diagram below which shows how this is done.



Maybe this idea looks familiar?

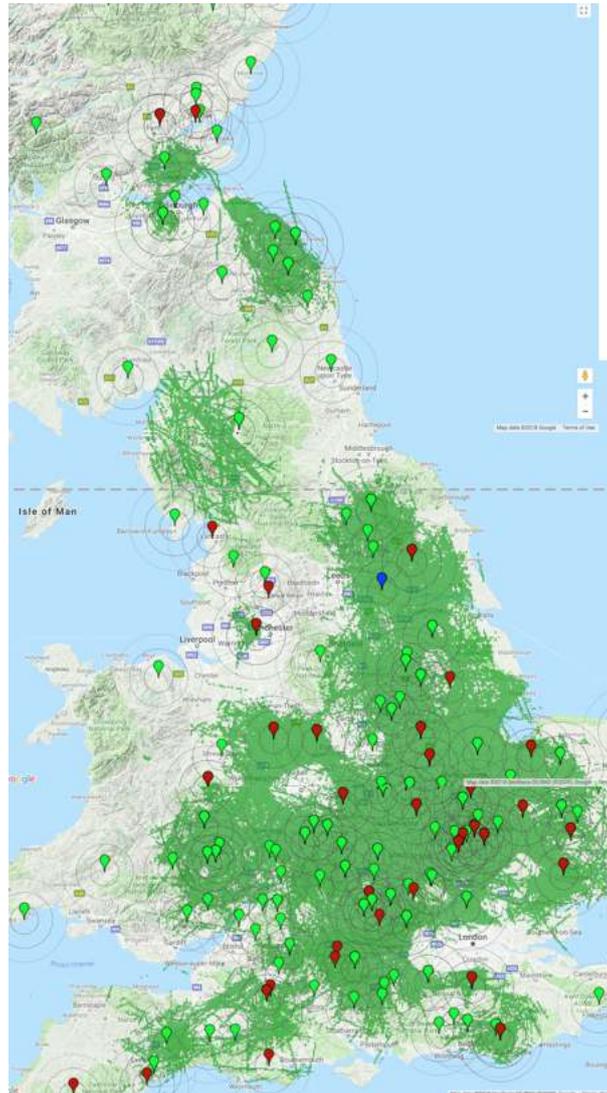
If it does, then this is because it was inspired by the dual US system of UAT(978Mhz) uplink of ADS-B(1090Mhz) data. So, if you are looking for a similar comparison, then consider PilotAware as the European UAT(869Mhz) – now providing a Ground-to-Aircraft Uplink in addition to existing Aircraft-to-Aircraft Traffic information. All at very close to real time.

Using a standard ETSI compliant PilotAware di-pole antenna, located at a suitable height as the OGN ground station antenna, the trial has shown that re-transmission distances in excess of 30Km have been achieved. To evidence this please see the heat map of PilotAware equipped aircraft detected in the UK since inception. Over time, a 30Km radius around each antenna provides a ‘sea of green’ indicating a near 100% coverage in the area as PilotAware equipped aircraft pass by at a reasonable height.

“This initiative bridges the significant gap between gliding and fixed wing traffic-awareness technology. More importantly it does it with neither group needing to install new, or modify existing equipment”

- Guy Glover OGN

By August 2018 over 75 locations have been installed in the UK with more planned to reach the initial target of 100 sites installed by the end of 2018. The map below shows the extent of the UK coverage.



Where do we go from here?

As can be seen from this map the coverage achieved in 18 months by the voluntary co-operation between the gliding and powered communities, is impressive. However, this is just the start and more sites are required;

- (i) to infill the gaps in the existing network to provide greater resilience, availability and redundancy
- (ii) to increase the range at the fringes especially at lower altitudes
- (ii) to install new sites where there is no coverage.

With a larger more resilient network there is the opportunity to provide more innovative services for all. Work is underway to do just this.

How Can You Help?

Throughout the UK, clubs, individuals and organisations have voluntarily, installed new OGN-R rebroadcast stations or upgraded existing OGN stations. We are now looking to increase this by help from you and your friends.

To help you in this, whilst stocks last, PilotAware™ will provide the Radio Bridge, a Raspberry Pi and a case **free of charge** to those that want to install an OGN-R rebroadcast station. This then leaves you to provide the

funding for the two antennas, coaxial cable, software defined receiver, power supply and antenna mounts. This will cost about £200 or less depending on the antennas and coax used. Low bandwidth internet and power is required at the site. Full details on downloading and configuring the software are available and PilotAware can provide assistance with this.

With an OGN-R rebroadcast station installed, PilotAware users are able to see OGN-R captured aircraft, at no extra cost, in an area of 30-40Km from the site. **To be clear no information will be provided on how to avoid the gliders and the gliders will receive no information on how to avoid or see you.** PilotAware users will be able to see and hear where the gliders are and be able to keep well away and let them get on with seeking lift and having a good day.

Other Advantages.

Once installed an OGN-R station can be used as the basis for a local **Virtual RADAR Station** showing PilotAware, FLARM and ADSB traffic in real time and Mode S traffic with a small delay using a Multi-Lateration feed. Great for flying clubs and enthusiasts.

For further information or to provide help <mailto:ogn@pilotaware.com>

For information on how to build an OGN-R rebroadcast station visit the OGN page at PilotAware.com.