

Working in partnership with **PilotAware**

– The PilotAware ATOM Station Explained –

Why should you install PilotAware?

The UK produced PilotAware ATOM station is a ground-based aircraft tracking system that detects more aircraft at lower levels, more accurately, with lower latency and importantly at a lower cost than any other system. It will provide you and your flying community with the best Virtual RADAR System available at any price.

In conjunction with the General Aviation community the ATOM station has been developed as part of the overall PilotAware infrastructure to detect more aircraft than any other system by using multiple technologies. These include direct aircraft detection, ATOM-GRID rebroadcast, Sky-GRID airborne data relay and i-GRID, the enhanced mobile network advantage. Over 370 ATOM stations have now been installed in the UK, with more stations being installed in mainland Europe.

An ATOM station detects and displays all aircraft on a Virtual RADAR screen on the ground, or on an iPad, Glass Cockpit or Flight Bag in your aircraft. Nothing comes close to PilotAware in the air or on the ground! Whether you're a flying club, an airfield owner, or a private pilot, passionate about safety, installing an ATOM station is a proactive step toward a safer, more connected airspace. With the PilotAware subsidy its inexpensive, addictive and fun.



What Is a PilotAware ATOM Station?

The ATOM station is a networked ground receiver that listens for multiple types of aircraft transmissions, including:

- **PilotAware transmissions**
- **ADS-B signals including Sky Echo**
- **Mode-S transponders**
- **FLARM and FANET**
- **Drones**

These signals are processed and relayed throughout the PilotAware network to contribute to enhanced in flight situational awareness for pilots and provide real-time traffic data to other airspace users. The PilotAware Network is expanding rapidly with over 370 sites installed at Airfields Airstrips, Gliding Sites, Paragliding Sites, Military Sites, Home installations and Drone Operations to improve Operational Volume Situational Awareness. With the PilotAware infrastructure and a PilotAware device installed in your aircraft you too will be fully aware. Above diagram is representative only. Smaller antennas are available for a more discrete installation.

Top Reasons to Install a PilotAware ATOM Station

1. Get the best virtual RADAR screen available

See more aircraft than any other system, including NATS. Track historic flights for Search and Rescue, Airprox with other aircraft, detect all aircraft individual EC devices via their unique ICAO code and see how good, or bad they are using PilotAware VECTOR. Track your colleagues across Europe on club flying safaris. METARS and Virtual weather is included for your site at no cost.

2. Improve Airspace Safety

An ATOM station provides direct visibility at the speed of light of aircraft that is transmitting any form of Electronic Conspicuity. It provides real time data about aircraft location, heading, and altitude to all nearby PilotAware users, contributing to mid-air collision avoidance, sense and avoid and safer circuit joining procedures.

3. Participate in the PilotAware Network

By installing an ATOM station, you contribute to the collaborative PilotAware network, helping to cover areas that currently lack ground-based receivers, and in turn the PilotAware servers will fill in the gaps that your antennas do not see directly. Each new station enhances the system's overall accuracy and reliability and therefore will increase the fidelity of your system. It really is that good.

4. Support for General Aviation, gliders, microlights, foot-launched aircraft and drones

The ATOM station detects all types of Electronic Conspicuity signals FLARM, Fanet, Sky Echo, Mode-S and ADS-B—ensuring broader coverage and inclusivity. The Network is dimensioned for low level flight in Class G and D airspace where the majority of GA activities are undertaken. It will of course track aircraft at higher levels as well but that's the easy part isn't it.

5. Easy Setup and Remote Logon and Maintenance

The station is easy to install using commercially available parts such as the ubiquitous, powerful Raspberry Pi Single board computer, Software defined radios, colinear antennas, and a power supply. Site Access, software updates and configuration changes are managed remotely, minimizing maintenance hassles. On-line PilotAware support is also freely available. Any club member with the appropriate logon and password can log on to access the system remotely bringing your operations and enjoyment into the 21st century.

6. Enhance local Aviation Safety

Airfields and flying clubs benefit by improving local airspace awareness, which is particularly important near uncontrolled fields or in busy VFR corridors. It also helps educate and involve local aviation communities in modern electronic conspicuity (EC) improving take up of the EC that suits your type of flying.

7. Improve your In-Flight Experience

With an ATOM Station installed you will be improving your in-flight experience when using your award winning PilotAware Rosetta or FX as part of your avionics and visual scan. See all EC transmitting aircraft within 60kms using PilotAWare i-GRID (tis-b) and Near Real Time Weather (fis-b). Innovative Situational awareness available now!



All aircraft within 60kms zoom in or out as you wish.

FINAL THOUGHTS

Installing a PilotAware ATOM station isn't just about improving your own flying experience—it's about contributing to a safer and more efficient flying environment for everyone. The relatively low cost, community benefit, and safety improvements make it a worthwhile addition to any airfield or enthusiast setup.

PilotAware introduce the concept of ground based rebroadcasts to allow users to see more aircraft than any other system. The growth has been fantastic and by helping you with your installation we will move towards ubiquitous implementation across the whole of the UK.

With initiatives like the UK CAA's endorsement of EC devices and the growth of grassroots aviation safety networks, the time to install a PilotAware ATOM station is now. Join the community and help make the skies safer—one signal at a time. For more information on how PilotAware will help you to install an ATOM station please email atom@pilotaware.com.

– The Future of Electronic Conspicuity –

PilotAware and the ADS-L Standard

The Aviation Landscape in the UK and Europe

Europe's skies are a complex blend of tightly regulated commercial airspace and a vibrant, diverse world of recreational and light aviation. The controlled airspace surrounding major airports like Schiphol and Stuttgart is crucial for citizen safety, efficient airline operations, and economic stability. These high-density zones demand the highest standards in Air Traffic Control (ATC) and Air Traffic Management (ATM), supported by robust systems of integrity, redundancy, and safety.

At the core of commercial aviation is the 1090 MHz frequency – a dedicated, internationally licensed aviation band with origins in the mid 20th century. Over decades, it has evolved to support technologies like Mode-S, TCAS, and ADS-B. But despite this evolution, it remains reliant on Pulse Position Modulation (PPM), a legacy technology that is becoming increasingly inefficient. As the skies grow busier, the 1090 MHz band is approaching saturation, threatening the very safety net it was designed to provide.

To protect this critical channel, it is essential that the 1090 MHz band remains reserved for commercial aircraft. General Aviation (GA) that wishes to integrate into fully controlled airspace must also use fully compliant EC systems operating on this band to ensure controllers can maintain deconfliction but it is not without its problems.

Uncontrolled Airspace:

The Home of Diverse and Recreational Aviation

Beyond the controlled zones lies the vast majority of low level European airspace — uncontrolled and used by a wide array of aviation enthusiasts and professionals. These include: permit and certified General Aviation (GA) aircraft, microlights, gliders, hang gliders, paragliders, wingsuit flyers, skydivers, large model aircraft balloons and drones.

Each of these platforms has unique characteristics in terms of speed, climb rate, flight profile, cost, and weather tolerance. For example, paragliders are low-speed, low-altitude, and relatively low-cost, while microlights offer more capability but still face practical constraints.

What unites these categories is the shared need for situational awareness — yet the traditional 1090 MHz EC equipment used by commercial aviation is unsuitable due to cost, weight, power consumption, and potential for worsening frequency congestion as identified earlier.

Moreover, it has become clear that a single EC solution cannot meet the needs of all these diverse aviation communities. "One size fits all" simply does not work.

The Emergence of the ISM Band and Innovative EC Solutions

Over the past two decades, companies like FLARM, SKYTRAXX, and PilotAware have harnessed the open ISM band to build tailored EC systems for light aviation. These solutions have proven themselves in the real world, enhancing safety and saving lives by enabling better situational awareness and mid-air collision avoidance.

EASA has recognised this voluntary adoption and the effectiveness of these technologies. As a result, it is leading the development of a common European protocol — known as ADS-L for use in the ISM SRD 860 band. This protocol aims to unify the EC landscape while maintaining compatibility across aircraft types, and the standard is also currently being enhanced and extended for air-to-ground capability.

PilotAware:

A Mature, Proven Solution – Ready for ADS-L Compliance

UK company PilotAware has been at the forefront of Electronic Conspicuity (EC) innovation since 2016 — and the good news for European aviation is that PilotAware already provides the multi-layered functionality that the emerging ADS-L standard is planning to deliver.

While no system today is fully ADS-L compliant, PilotAware has designed its platform with possible future compliance. Since 2016 all PilotAware devices, including the latest PilotAware FX, operate on 869.525 MHz, using its own protocol, which has already been proven to be successful across thousands of aircraft and over 450 ground stations.

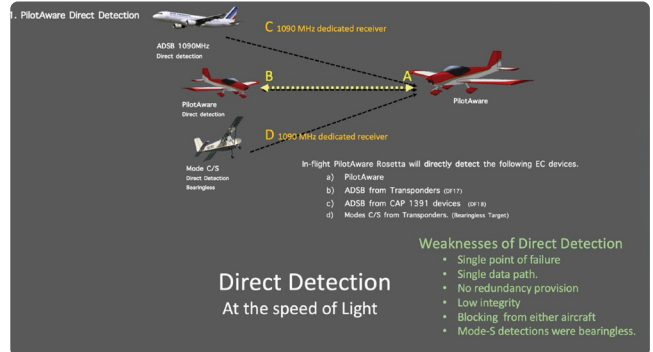
When finalised, if the future ADS-L protocol is compatible, PilotAware will support it through an over-the-air update, ensuring the minimum fuss and the need for extensive new hardware. We remain committed to working with EASA and the other stakeholders to develop the new standard — while continuing to serve the General Aviation community with practical, innovative upgradable equipment available now from PilotAware.

PilotAware's existing multi-layered network

The PilotAware ecosystem already goes beyond simple peer-to-peer transmission. It combines four layers of data exchange for maximum reliability, awareness, integrity, redundancy in preparation for the needs of the next generation of Situational Awareness.

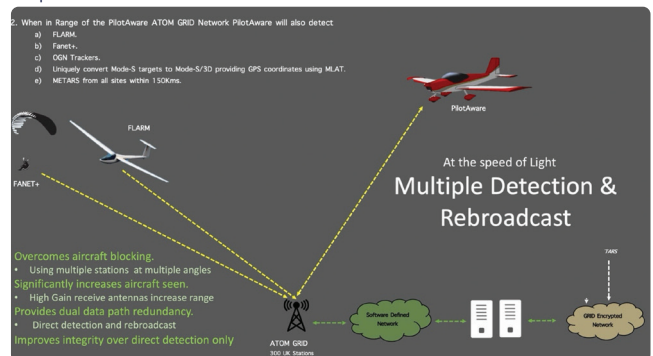
1. Direct Peer-to-Peer Detection (Primary Layer) PilotAware-equipped aircraft transmit and receive EC messages directly using 869.525 MHz — a dedicated ISM SRD 860 frequency capable of air to air and air to ground broadcast transmissions. This peer-to-peer exchange operates at the speed of light, just like traditional EC systems, and forms the first stage of the PilotAware situational awareness matrix. This allows PilotAware users to detect PilotAware, ADSB-out (DF17),

CAP1391(DF18) in the UK and Mode-C/S transmissions as bearingless targets.



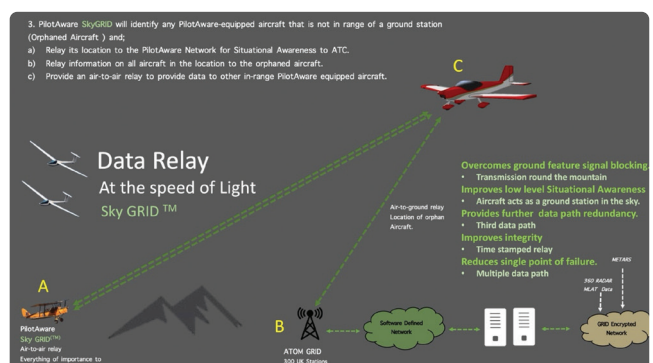
2. The ATOM Ground Station Rebroadcast Network

secondly, PilotAware's network of ATOM ground stations acts as ground-based mediation and translation relays, capturing transmitted EC data (including Mode-S, FLARM and FANET) and rebroadcasting it on 868.525MHz to nearby PilotAware equipped aircraft. Transmitted at the speed of light, with virtually no latency, PilotAware equipped aircraft receive time stamped, accurate information about surrounding traffic but without the need to have multiple expensive EC devices fitted.

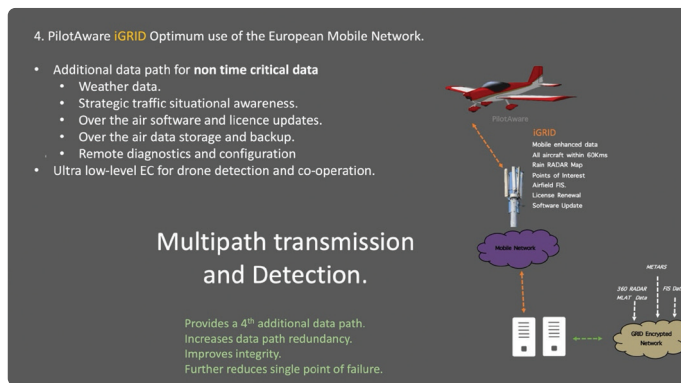


3. SkyGRID: The Airborne Mesh Network.

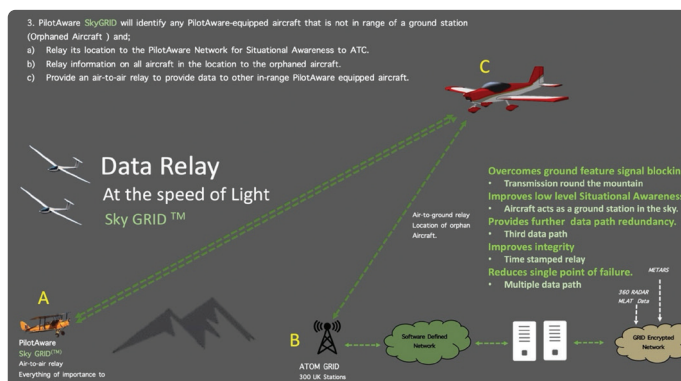
PilotAware's third trade-marked technology SkyGRID™ is an innovative airborne extension of the ATOM network. Aircraft, equipped with PilotAware devices, act as flying ATOM stations, creating a dynamic mesh that enhances EC coverage and data-sharing even in remote areas. This airborne grid dramatically increases the reach, integrity and robustness of the PilotAware network, eliminating topographical obscuration and ensuring that connected low-flying aircraft and drones are not lost to the PilotAware infrastructure.



4. **iGRID:** Mobile Network Integration Finally PilotAware's iGRID connects PilotAware devices to the cellular network to provide near real-time traffic and flight information updates such as enhanced traffic (tis-b) and weather data (fis-b). While the mobile network is not ideal for uses as a primary EC system due to variable availability latency, the mobile network is however, highly effective for supplementary traffic information, over-the-air software updates, and licence renewals. It also adds yet another layer of integrity to the overall solution.



Together, these four methods create a rich, resilient mesh network — one that is unmatched in today's GA market whilst heralding the future for multi technology Electronic Conspicuity.



A Growing Infrastructure across the UK and Europe

PilotAware is proud to support this vibrant and growing EC infrastructure across the UK and Europe. There are already close to **400 ATOM stations installed across the UK and Northern Ireland**, creating a dense and proven rebroadcast coverage network. An additional **60 stations are already operational across Europe**, and the goal is to significantly expand this footprint over the next 24 months, for example 10-15 stations are being installed by the National Microlight Association of Ireland to improve aviation safety in Eire.

To encourage broader participation and bring the full mesh network to more European regions, **PilotAware is offering financial subsidies to flying clubs, airfields and individuals that wish to host PilotAware ATOM station.**

To encourage broader participation and bring the full mesh network to more European regions, PilotAware is offering financial subsidies to flying clubs, airfields and individuals that wish to host a PilotAware ATOM station. This initiative provides improved visibility and safety for all EC users whilst providing a world class Virtual RADAR screen of the surrounding airspace.

Installing an ATOM station is straightforward, low-maintenance, and opens the door to higher situational awareness, better training environments, and closer alignment with the future EC vision being developed at the European level. For more information on how you can include your area contact atom@pilotaware.com

PilotAware FX

Equipping an aircraft with PilotAware FX is straightforward and cost-effective due to its low price. Here is what makes FX combined with the PilotAware infrastructure an EC winner.

Interoperable – FX see more aircraft EC types with the lowest latency and greatest integrity available using the full infrastructure previously described.

Interactive – FX interacts with your existing avionics screens via WiFi or wired RS232 interfaces to provide fully integrated traffic data to your EFB, Glass Cockpit etc. Integration with your local mobile phone is also provided including router functionality.

Enabling – links seamlessly with existing FLARM installations to integrate local FLARM traffic with all other received traffic in and out. Enables existing Mode-S transponders with ES to become ADSB-out at full 70W SIL=0 via a simple inexpensive cable.

All New Design – bottom up HW and SW design improves all facets of transmission and reception. Low power from multiple power sources from 5V-28V. Intuitive new software interface with gesture controlled RADAR screen

Various Options – FX can be a carry on Installation, use remote internal or external antennas and there is even a drone sized version.

