Airspace4All GA Airfields ATS ADS-B Traffic Display Trial

Trial Safety Plan

Version 1.0

Approved

12/10/2018

Executive Summary

Under the auspices of the CAA Electronic Conspicuity Working Group (ECWG), in July 2017 FASVIG published a document to the ECWG entitled "FASVIG GA Airfield Pseudo Radar Trial" outlining a proposed trial of low-cost Automatic Dependent Surveillance Broadcast (ADS-B) traffic display technology by GA airfields ATS units. This was endorsed by the CAA in a public statement on 16th August 2017.

FASVIG Limited was renamed as Airspace4All Ltd on 1st September 2018.

Airspace4All propose to run the Airspace4All GA Airfield ADS-B Traffic Display Trial ('the trial') during a six month window commencing in 2018.

The aim of the trial is to gather evidence to enable the CAA to assess this capability and give consideration to policy change authorising use of ADS-B real-time traffic displays by GA ATS units. Additionally, it is hoped this trial will encourage further development of technology to support ATS provision at UK GA airfields.

For the duration of the trial the ATS Units at three GA airfields (the 'Trial Airfields') will be equipped with real-time flight tracking equipment that provides a situational awareness tool (which is not to be used to provide any form of Air Traffic Control service).

The proposed Trial Airfields are:

- City Airport Manchester Barton (Barton)
- Chichester/Goodwood Aerodrome (Goodwood)
- Gloucestershire Airport (Gloucester)

Additionally, to complement those aircraft already equipped with ADS-B Out, a number of general aviation aircraft based at the Trial Airfields will be equipped with CAP1391-compliant ADS-B Out devices. Airborne ADS-B capabilities of the CAP1391 compliant devices are outside the scope of the trial.

The data transmitted by General Aviation aircraft during the trial is not assured, and has been treated as such in the safety assessment.

On 17th September 2018 the CAA published a consultation on FISO Licensing[1] that formally proposes a licensing change that could permit use of surveillance tools by FISOs. The CAA consultation document is CAP 1669[2]. This is further endorsement of the aims of this trial.

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[1] Review of CAA Policy on the Training, Qualification and Licensing of Flight Information Service Officers (https://consultations.caa.co.uk/future-safety/fiso-training-qualification-licensing-review/)

[2] http://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8656

Publication History

Issue	Month/Year	Change Requests in this issue
0.1 Draft	March 2018	First Issue – DRAFT for comment
0.2 Draft	June 2018	Second Issue – DRAFT for comment
0.3 Draft	July 2018	Third Issue – DRAFT for comment Amended to address comments from CAA ATC Inspectors.
0.4 Draft	September 2018	Fourth Issue – DRAFT for comment Amended to address comments from CAA ATC Inspectors.
1.0 Approved	October 2018	Final version approved by CAA

Reviewed and Agreed

Name	Role
▇▇▇▇▇▇▇▇	Airspace4All Electronic Conspicuity Lead & Trial Project Manager
▇▇▇▇▇▇▇	CAA, Future Systems Coordinator

Additional Distribution

Name	Role
▇▇▇▇▇▇▇	CAA, Manager, Future Airspace
▇▇▇▇▇▇▇	Gloucester
▇▇▇▇▇▇▇	Barton
▇▇▇▇▇▇▇	Barton
▇▇▇▇▇▇▇	Goodwood

1 Introduction

The Trial Airfields will be equipped with real-time flight tracking equipment that provides a situational awareness tool (which is not to be used to provide any form of Air Traffic Control service).

A number of General Aviation aircraft based at the Trial Airfields will be equipped with ADS-B Out devices as part of a trial. The trial will take place during a six month window commencing in 2018[3].

This Safety Plan details the scope, agreements, applicable standards, activities, responsibilities and dependencies. It also provides a timeline for the trial.

1.1 Objectives

1.1.1 ADS-B Trial Objectives

The objectives of the trial are as follows:

- Gather information to allow the CAA to assess and potentially authorise the use of ADS-B Traffic Displays at GA airfields[4].
- Reduce the probability of mid-air collisions.
- Provide increased situational awareness, potentially resulting in a reduction of aircraft infringing CAS, i.e. penetrating controlled airspace without an ATC clearance.
- Provide indication that aircraft are complying with local traffic regulations.

Upon completion of the trial, the results will be evaluated and a trial report written.

1.2 Scope of Trial

The scope of the Trial is as follows:

Within Scope

- Aircraft operations in the vicinity of the Trial Airfields only.
- ATS operational aspects resulting from using the ADS-B Traffic Display system.
- Safe use of ADS-B Traffic Display (including position plots with no integrity)

Outside of Scope

- Any third party devices that are connected to the airborne ADS-B unit (e.g. iPad with moving map).
- Air-to-air links, as that requires additional airborne equipment (i.e. cockpit display device).

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[3] Dates to be determined.

[4] On 17th September 2018 the CAA published a consultation on FISO Licensing4 that formally proposes a licensing change that could permit use of surveillance tools by FISOs.

- Integrity of cloud based data.
- Equipment assurance for airborne and ground based equipment, meaning:
    - Equipment integrity.
    - Software assurance.
    - Electro Magnetic Interference (EMI) and interference with other systems and equipment.
    - Health and Safety at Work aspects, or project and financial risks.

2 System Description

2.1 ADS-B Network Overview

Automatic Dependent Surveillance Broadcast is a surveillance technology in which an aircraft determines its position via Global Navigation Satellite System (GNSS), and continually broadcasts it, which enables it to be tracked. The ADS-B system does not wait to be interrogated, like a conventional transponder. It can also receive position data from other aircraft equipped with ADS-B Out.

ADS–B is "automatic" in that it requires no pilot or external input, and is "dependent" in that it depends on data from other aircraft systems.

2.2 The Trial Airfields

The Trial Airfields have a range of commercial aviation activities, ranging from helicopter and fixed wing charter services, to flying training and aircraft maintenance. The aerodromes are also home to a number of private aircraft.

The Barton ATZ abuts the Manchester CTR, and is wholly in Class G under the Manchester CTA (2000ft). Barton ATS is licensed to provide an Aerodrome Flight Information Service (AFIS).

The Gloucester ATZ is wholly within Class G with no overlying CAS to impact circuit traffic. Gloucester ATS is licensed to provide an Air Traffic Control Service. Gloucester air traffic services are TOWER, APPROACH, RADAR and INFORMATION (ATIS). Gloucester has an existing Radar Aerodrome Traffic Monitor.

The Goodwood ATZ is wholly within Class G, under the London TMA (FL65) which does not have any impact on circuit traffic. Goodwood ATS is licensed to provide an Aerodrome Flight Information Service (AFIS).

Detailed aerodrome information is available in the Aeronautical Information Publication (AIP).

During the trial ATS units at the participating airfields will use a standalone pingStation ADS-B receiver from uAvionix[5] which provides real time traffic position data, including altitude, based on aircraft ADS-B broadcasts with no built-in delay. The system does not support MLAT, and does not provide a view of Mode A, C or S traffic. The data will be presented
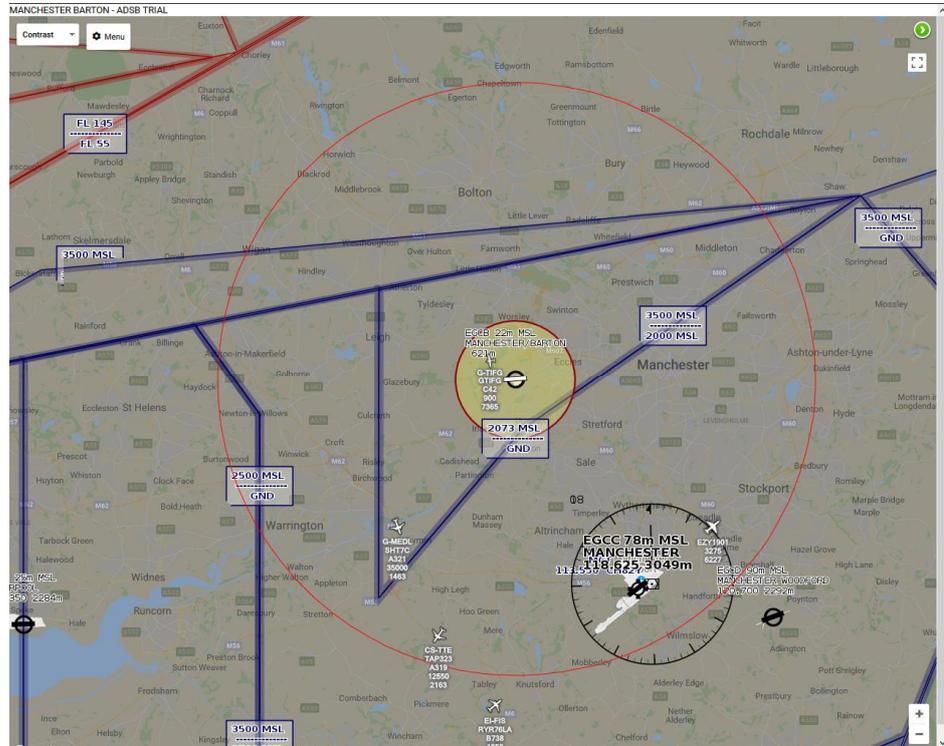

[5] https://www.uavionix.com/products/pingstation/

to ATS staff on a conventional Microsoft Windows PC running Virtual Radar Server[6].

The ADS-B service will be provided in the vicinity of the aerodrome, where vicinity is defined as being coincident with the unit's Designated Operational Coverage for RT purposes (typically 10nm radius and up to 3000ft or the base of controlled airspace, whichever is lower). Filters can be set in the VRS software to deactivate the display of aircraft overflying at high level that do not affect the airfield traffic.
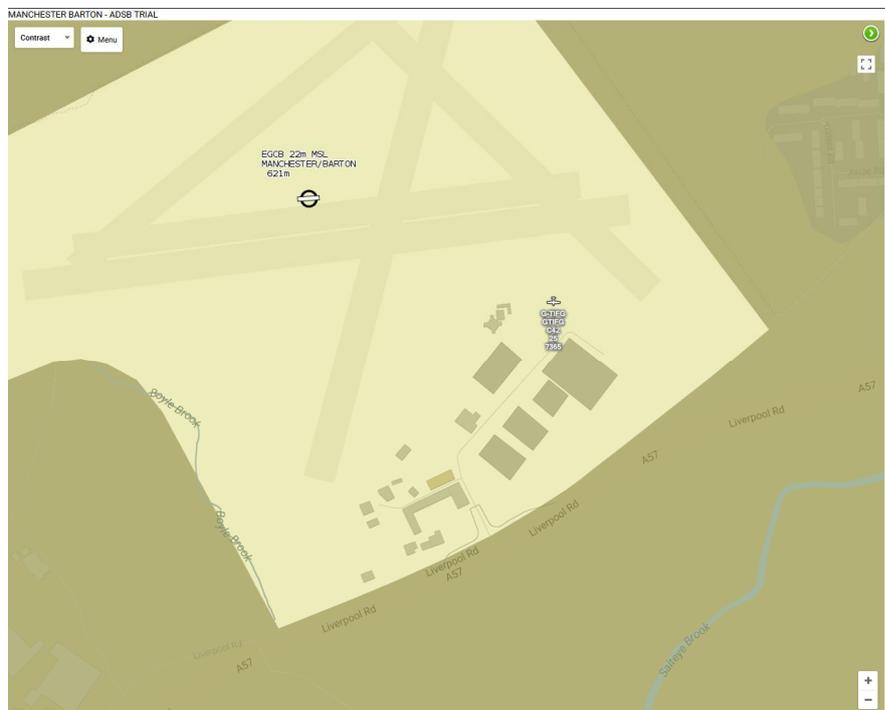
The display can be zoomed in to focus on a smaller area, e.g. just the airfield to aid situational awareness of aircraft ground movements.

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[6] http://www.virtualradarserver.co.uk/

2.3 Airborne Equipment

'ADS-B Out' provides the broadcasting function of the system. An aircraft equipped with 'ADS-B Out' capability will continuously transmit aircraft data, such as airspeed, altitude, and location, to other ADS-B receivers, which may be airborne or ground based.

A number of aircraft operating in the UK, and at the trial airfields already have ADS-B Out capability. These aircraft will be automatically detected by the ADS-B ground station. For the duration of the trial, to bolster the number of ADS-B target aircraft, Airspace4All will be loaning out a number of ADS-B devices for use in otherwise non-ADS-B equipped aircraft based at the trial airfields. Airspace4All will work with the trial airfield ATS units to help select appropriate high utilisation aircraft to maximise the utility of the loan equipment for the benefit of the trial. The ADS-B devices being loaned out are uAvionix skyEcho devices.

The skyEcho is able to function as a standalone unit. It incorporates a Satellite Based Augmentation System (SBAS) and Receiver Autonomous Integrity Monitoring (RAIM) enabled GNSS that transmits 1090 MHz position data. The transmitter has a 20 Watt nominal output.

The skyEcho also supports 'ADS-B In' functionality, which provides the receiver function of the system. 'ADS-B In' equipment allows aircraft to receive and interpret the signals from other aircraft's 'ADS-B Out' data. Traffic information may be displayed to the pilot on installed equipment, such as a multifunction display (MFD). If within range of a transmitter, the skyEcho can also receive 978MHz UAT weather broadcasts that are currently being trialled at a number of locations in the UK, including Goodwood. Pilots are welcome to use these facilities. However, note that the 'ADS-B In' and weather data reception capability plus any external presentation devices are **not within the scope of this trial**.

According to CAP 1391, Electronic Conspicuity devices capable of 1090MHz extended squitter do not require specific approval by the National IFF/SSR Committee (NISC) to operate, providing they comply with the requirements of Annex 10 to the Convention on International Civil Aviation Volume IV, or Standardisation Agreement (STANAG) 4193, as appropriate. The Sky Echo unit is CAP1391 approved.

The skyEcho GPS is a TSO-C199, Class B approved GPS. skyEcho's GPS complies with the GNSS Position Source Function Requirements (For Class B Devices), including Fault Detection and Exclusion, as defined in TSO-C199 Section A.1.2.6.

2.4 Potential Safety Benefits

The overall purpose of ADS-B is to increase pilot and controller Situational Awareness (SA). In this context, this leads to the following potential safety benefits:

1. Reduced Chance of a Mid-air Collision

GA aerodromes can be busy, and are often used by inexperienced pilots, such as students. An ADS-B display provides ATS Staff with more complete information to base traffic advisories and avoiding instructions on.

2. Reduced Chance of Runway Incursion

An ADS-B display provides ATS Staff with more complete information on aircraft ground movements of aircraft taxying around the airfield.

3. Reduced Chance of Airspace Infringement

This is of particular importance for airfields in close proximity to controlled airspace and danger areas.

3 Equipment

3.1 Equipment owned by Airspace4All

Airspace4All has purchased the following quantities of equipment for use in the trial:

- 3x uAvionix pingStation ADS-B ground receivers plus fixtures.
- 50x uAvionix skyEcho CAP1391-compliant ADS-B transceivers
- 50x Power-over-Ethernet Power Injectors (to deliver power to the skyEcho)

The above equipment remains Airspace4All property and will be loaned out for the duration of the trial, subject to the loan agreements.

3.2 Equipment required by Trial Airfield ATS Units

Airspace4All will loan a uAvionix pingStation and PoE Power Injector to each trial airfield ATS unit for their use during the trial.

3.2.1 Equipment to be supplied by Trial Airfield ATS Units

The trial airfield ATS Units will require the following additional equipment:

- Personal Computer, complete with Screen, Keyboard, Mouse, Network Card
- Ethernet network switch with internet connectivity
- 2x Ethernet cables
- 2x 240v mains power sockets
  - 1 for PC,
  - 1 for PoE Power Injector (not required if network switch supports PoE)
- Mounting pole for pingStation plus building fixtures
  - (Fixture to mount pingStation to pole are included with loaned pingStation)

The trial airfield ATS units are responsible for funding and arranging the procurement and installation of the above additional equipment, including any building adaptations required for the routing of cables. Airspace4All will provide advice and assistance where required.

3.2.2 Software

The trial airfield ATS units will require the PC to have the following software:

- Microsoft Windows
- Web browser
- Virtual Radar Server
  - Downloadable free from
    http://www.virtualradarserver.co.uk/Download.aspx

The trial airfields are responsible for funding, procuring, installing and setting up the above software. Airspace4All will provide advice and assistance where required.

3.3 Loan of Airborne Equipment

Airspace4All will work with the trial airfield ATS units to recruit suitable based aircraft owners/operators to participate in the trial in order to bolster the number of ADS-B target aircraft visible on the ATS Unit ADS-B Traffic Displays. This will be achieved by loaning a number of skyEcho devices to participating aircraft based at the trial airfields.

The some aspects of the selection criteria will be:

- High aircraft utilisation rate
- Agreement to regularly use the skyEcho device
- Acceptance of the skyEcho loan agreement

Although not a mandatory requirement, it is anticipated that the selection criteria will be more easily met by flying schools and flying clubs where individual aircraft are flown more frequently and by many different pilots.

Participants will be loaned a skyEcho device and USB cable. The participant will need to provide an appropriate power charging point with USB connectivity. The skyEcho battery has a capacity for about 5 hours use before needing to be recharged.

4 Equipment Documentation

4.1 Ground Receiver

Manufacturer documentation for the uAvionix pingStation:

Datasheet:
http://uavionix.com/downloads/pingstation/pingStation-data-sheet.pdf

User and Installation Guide:
http://uavionix.com/downloads/pingstation/pingstation-user-guide.pdf

4.2 Traffic Display Software

Manufacturer documentation for the Virtual Radar Server software:

VRS Server:

http://www.virtualradarserver.co.uk/Documentation/WebServer/Default.aspx

All other VRS documents (for information only):

http://www.virtualradarserver.co.uk/Documentation/Default.aspx

4.3 Airborne Equipment

Manufacturer documentation for the uAvionix skyEcho:

Datasheet:
https://uavionix.com/downloads/skyecho/SkyEcho-data-sheet.pdf

Installation and Pilot's Guide:
https://uavionix.com/downloads/skyecho/SkyEcho-User-and-Installation-Guide.pdf

Quick Start Guide:
http://uavionix.com/downloads/echoapp/uAvionix-echo-app-Quick-Start-Guide.pdf

5 Installation

This section provides an overview of the installation procedures.

5.1 Groundstation

5.1.1 Ground Receiver

The positioning of the mounting pole needs to provide a clear line of sight to the airfield circuit pattern to maximise the effectiveness of traffic detection.

Guidance on installation in the uAvionix pingStation documentation should be followed. For network configuration, follow the instructions in section '9 Virtual Radar Server Receiver'. The pingStation is best configured with a constant IP address – either a static IP address or setting DHCP to always allocate the same IP address. The IP address of the PC must be configured in the pingStation settings. Airspace4All will provide further advice where required.

5.1.2 Traffic Display

The Windows PC should be setup and positioned in accordance with the criteria defined in the Trial Safety Case.

The Virtual Radar Server software should be downloaded and setup in accordance with the VRS Server documentation and pingStation Guide section 9. VRS needs to have the IP address of the pingStation configured in the settings. The IP address of the PC needs to be fixed so that the IP address can be configured in the pingStation settings.

5.1.3 Initial Testing

Once powered up and functioning, the LED on the pingStation should show as green and will flash red when ADS-B traffic messages are being decoded. Status information can be checked by accessing the pingStation IP address URL from the browser (see section 7 of the pingStation Guide). After setup verify that the Virtual Radar Server shows a Connected status and that the message counter is increasing. Transiting high-level commercial traffic should begin to show up on the display once all configuration settings are correct. If not, there is probably still some misconfiguration to be fixed.

5.2 Airborne Equipment

Please see the skyEcho Installation and Pilot's Guide and the Quick Start Guide for setup instructions. Configuration of the device is carried out using the uAvionix smartphone app described in the Quick Start Guide. A once only process is required to configure the aircraft registration and ICAO 24 bit aircraft address (HexID).

The skyEcho has an internal rechargeable battery with capacity for 5 hours use. It is recharged via a USB cable.

Use of the skyEcho devices for ADS-B Out is relatively simple. Once configured with an aircraft's ICAO 24 bit aircraft address (HexID) using the smartphone app, it is a matter of ensuring that the device batteries are charged up in advance of flight and that during the pre-flight check the device is placed in a safe location on top of the instrument panel and is switch on.

For flying schools/flying clubs with multiple aircraft and multiple skyEchos, it is imperative that care is taken to select the correct skyEcho unit with correct HexID for the aircraft in which it is to be used. If this is not done, the aircraft will be wrongly reported on the ATS Traffic Display.

For aircraft with a Mode S transponder a waiver is required from the CAA as currently CAP1391 precludes simultaneous use of a skyEcho and a Mode S transponder. CAA and NATS are currently trialling this simultaneous use scenario and so far no issues have been detected. Pilot volunteers were sort for this CAA/NATS trial. For aircraft operators with Mode S transponders participating in the Airspace4All GA Airfield ATS ADS-B Traffic Display Trial, CAA will the grant the required waiver authorising simultaneous use.

6 Preparatory Actions

This sections outlines the preparatory actions that each airfield must undertake in order to initiate the trial at their airfield.

6.1 Complete and Return Letter of Agreement (Airfield)

Each Trial Airfield must complete, sign and return to Airspace4All the Letter of Agreement (Airfield). This letter confirms the agreement between the airfield and Airspace4All covering the airfield's commitments and responsibilities for taking part in the trial.

Please see Appendix A Letter of Agreement (Airfield).

Once Airspace4All has received the Letter of Agreement (Airfield) the loan pingStation ADS-B receiver will be shipped to the airfield ATS unit.

6.2 Equipment Installation, Setup and Configuration

Each Trial Airfield must complete the Traffic Display equipment acquisition, installation, setup and configuration as described above. Airspace4All will be happy to assist where possible to clarify any unanticipated issues.

6.3 Airfield Documentation

Each Trial Airfield must complete the formal documentation as outlined in the Safety Case Report. Airspace4All will be happy to assist where possible, and any queries on regulatory requirements can also be taken up with the CAA ATS Inspector.

See: Airspace4All GA Airfield ATS ADS-B Traffic Display Trial Safety Case Report

6.4 Recruitment of Aircraft Owners/Operators

The Trial Airfield ATS Units know their own based aircraft flying community so are best placed to carry out the initial recruitment of suitable non-ADS-B-Out-equipped participants to fly with the loaned skyEcho portable ADS-B transceivers. Please see sections 3.3 above for requirements.

The Airfield ATS Unit must complete/maintain the skyEcho Loan Register (see Appendix S), a copy of which must be forwarded to Airspace4All when first created and when updated.

Please also see Appendix B Letter Of Agreement (Participant). The Airfield ATS Unit will provide a copy of the agreement, which must be completed, signed and returned by each aircraft owner/operator before they can receive their loan device.

Use of the loan skyEcho portable ADS-B equipment is relatively simple. The Airfield ATS Unit will provide the skyEcho documentation to the participants (all available online - see section 4.3 and 5.2 above).

Once numbers of recruited participants are confirmed, Airspace4All will ship out the skyEcho devices to the ATS units for onward delivery to the participants, noting the requirement to log the device-to-aircraft association on the skyEcho Loan Register.

Where requested, Airspace4All will offer advice and guidance direct to participants on the use of the skyEcho devices.

Airspace4All will work with Airfield ATS Units to optimise the roll-out and use of the skyEcho devices.

6.5 Week One Start-Up Phase

Once documentation is complete and the Traffic Display equipment in installed, setup and configured, the first week of the trial will be set aside as a 'Start-Up' Phase for evaluation and training, giving early opportunity to assess coverage, ADS-B data reception and display of traffic.

It will also provide an opportunity for the relevant CAA Inspector to visit and review status before giving final approval. The trial at an airfield cannot proceed beyond the 'Start-Up' Phase until the relevant CAA ATM Regional Office has given approval for that specific airfield.

Note that completion of the recruitment of aircraft owners/operators is NOT a prerequisite for commencement of this Week One 'Start-Up' Phase.

7 Operation

As each airfield exits its 'Start-Up' Phase it will enter the trial proper, which will run for a maximum period of six month or such earlier time as it is deemed by Airspace4All that sufficient data has been gathered.

7.1 Daily Check

During the trial period the ADS-B Traffic Display should be started up at the beginning of each day and checks performed to confirm it is operational. Altitude filters can be set to avoid distraction from high-level CAT traffic. However, temporarily resetting the filter to enable visibility of high-level CAT traffic is a simple method to confirm operational status. Checks and filter controls will be included in the Training Plan and Temporary Operating Instructions.

7.2 Usage and R/T Guidelines

The ADS-B Traffic Display is first and foremost a situational awareness tool and it is not to be used to provide any form of Air Traffic Control Service. Aircraft are never to be vectored or provided with turns based on the displayed information.

ATS staff should always be aware that the **ADS-B Traffic Display will not show aircraft which are not equipped with ADS-B Out** and, because it is dependent on line-of-sight, an aircraft which is out of 'sight' will not necessarily show on the display. Out of 'sight' can be due to terrain or the aircraft's own fuselage blocking its ADS-B broadcast reaching the ground receiver.

Referring to the ADS-B Traffic Display is not a mandatory task for ATS staff however it is encouraged for early recognition of possible errant positional reports and potential navigational errors.

As already stated the ADS-B Traffic Display is **not to be used**:

- To provide any form of Air Traffic Control Service, and additionally;
- As a substitute for pilot position or level reports or to replace any mandatory read-backs.

The ADS-B Traffic Display can be used to:

- Confirm pilot reports and
- Confirm that the direction of travel is in accordance with the pilots stated intentions

> **Note:** The ADS-B Traffic Display positional information does not constitute the identification of an aircraft in any way, however when used in conjunction with other available mechanisms (e.g. visual confirmation, verification from an adjacent radar unit, etc.) it can be used to confirm or query pilot reports in the above instances.

Where ADS-B Traffic Display derived information indicates a variance with an ATC clearance, routing or pilot report and this is supported by one of the other tools available, ATS staff may query the discrepancy. In such instances the phraseology to be used is:

> *'(Callsign) confirm your position/level/routing'*

> *If the pilot's report is still in discrepancy with the ADS-B Traffic Display position, ATS staff should not provide further challenge but may confirm the level of service being provided together with the relevant pressure setting.*

> *All instances of such challenge shall be recorded in the trial feedback and in the event of a Safety Critical situation, via the normal reporting process.*

The passing of traffic information based on the ADS-B Traffic Display picture must remain generic but can be more targeted on the basis of position reports of opposing traffic:

> **Acceptable Traffic Information:**

> *'(Callsign), multiple aircraft believed to be operating in the (location) area'*

> *'(Callsign), traffic just reported over (location) at (height reported by joining traffic) joining down-wind left-hand for Runway (xx)'*

> **Unacceptable Traffic Information:**

> *'(Callsign) traffic in your twelve o'clock range three miles'*

> *'(Callsign) traffic on a reciprocal track, turn left/right heading xxx'*

In the event that an ATS staff believes that a potentially dangerous situation is imminent they may provide more enhanced traffic information from a Duty of Care perspective however **they must not provide specific de-confliction measures**.

> *'(Callsign) I believe you may have traffic in close proximity (no positional or level information is to be given)'*

Where it is suspected there is a possibility an aircraft on frequency is about to infringe CAS, ATS Staff may advise pilots of their proximity to the CAS, enabling the pilot to resolve the situation before an actual infringement occurs:

> *'(Callsign) I believe you are approaching the (CAS name), confirm your intentions'.*

Where it is believed that an aircraft on frequency has infringed CAS, ATS Staff should advise pilots to contact the ATC Unit for the CAS:

'(Callsign) I believe you are within (CAS), contact (CAS ATC Unit) immediately on (CAS ATC Unit frequency)'.

7.3 'Cease Operations'

Although unlikely, it is possible that there may be cause to cease operations of the trial at short notice. This instruction may come from Airspace4All or the CAA. In such a situation the instruction will be relayed by telephone and followed up with an email. Upon receipt of the 'Cease Operations' telephone instruction the ATS Unit is to:

- Immediately switch off the Traffic Display, and
- Power down the pingStation ground receiver by disconnecting the Ethernet cable.
- By email, Confirm compliance with the 'Cease Operations' instruction, including date/time of compliance.

The ATS Unit may also decide to 'Cease Operations' if it identifies an issue that adversely affects operational safety. In such circumstances the ATS Unit must carry out the steps described above and advise Airspace4All and the CAA of the rationale for their 'Cease Operations' decision.

7.4 Completion of Feedback Forms

Upon exiting the 'Start-Up' Phase all ATS staff will start to provide feedback on the trial using the appropriate forms and will continue to do so for the duration of the trial.

See section 8.3 for further details.

8 Assessment

The trial is intended to assess the suitability of equipment as a situational awareness tool for use by GA airfield ATS units. It is not intended to replace existing Surveillance Systems but explore how they can be enhanced in the future.

When the CAA approves a Surveillance system they ordinarily look at Required Surveillance Performance (RSP). The RSP is developed from evidence of system capabilities and performance that is gathered through trial work; such as the Airspace4All GA Airfield ADS-B Traffic Display Trial.

The Airspace4All trial will gather such evidence from the trial airfield ATS Units through the use of ADS-B ground receiver antennae and presentation of received data to the trial airfield ATS Unit. This evidence will help in the development of an RSP to enhance ground situational awareness. The trial will assist in assessing the use of low cost/low integrity surveillance data to Aerodrome FISOs for improved situational awareness; and in assessing the use of low cost/low integrity Aerodrome Traffic Monitors for situational awareness purposes only (i.e. not all the functions currently allowed of an ATM in MATS Part1).

When looking at system performance requirements the CAA will look at the headings listed below. The CAA recognise that the nature of the Airspace4All trial is such that not all of these parameters will be recorded or required.

It is also noted, that for the purpose of this trial:

- The data will not be used for the purposes of providing an Air traffic Control service but gather human factors information needed to help define requirements for a potential future operational display;
- If the system ceases working, or works erroneously there should be no safety impact on ongoing operational service provision;

8.1 Assessment Data Collection

The following are examples of data to be gathered and reported:

- Ground display consistency and accuracy
- Ground display characteristics/requirements:
  - Usability
  - Presentation (Map, Background, Traffic, supporting data)
- Human Factors
  - How ATS staff perceive the usefulness / relevance of the information
  - How would ATS staff see future use of such information?

8.2 System Performance Criteria

The following systems performance criteria are suggested as appropriate benchmarks for assessing the performance of the ADS-B Traffic Display.

Update period	5 seconds or less
Accuracy/precision[7]	200 metres
Reliability	MTBF 30 days
Availability	98% uptime
Latency	5 seconds or less
System/Data integrity (Incidences of position reports outside of Accuracy/Precision Metric)[8]	Once in 30 days or better
coverage	Range of at least 10NM

8.3 ATS Staff Feedback and Reporting

During the trial period each ATS staff member is required to record details of pertinent events/situations (positive, neutral or negative) relevant to the trial assessment criteria and system performance criteria above. Feedback form templates are included in the appendices for this purpose.

There are two feedback forms:

- Duty Period Feedback Form
- Monthly Feedback Form

Each member of ATS Staff should complete their own form describing their experience of using the ADS-B Traffic Display at the end of each duty period and at the end of each calendar month, using the appropriate form.

The completed forms should be posted to the Airspace4All Trial Manager at the end of each month (or emailed if maintained in electronic form – which is preferred).

Although not yet created, it is the intention to simplify the process of providing feedback by replicating the feedback forms on a webpage. The process for completing the online forms will be notified to all Trial Airfields once set up.

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[7] Dependent on accuracy of position data in received ADS-B broadcasts.
[8] Dependent on accuracy of position data in received ADS-B broadcasts.

9 End of Trial

At the end of the trial, or when otherwise requested by Airspace4All, the Airfield ATS Unit, within one month will:

- Decommission the traffic Display equipment and return the pingStation, mounting brackets and PoIP Injector safely to Airspace4All.
- Collect the loaned skyEcho portable ADS-B transceivers from all participants and return them to Airspace4All.

APPENDIX A Letter Of Agreement (Airfield)

Letter of agreement between Airspace4All and the Trial Airfield for the Airspace4All GA Airfield ADS-B Traffic Display Trial. A copy of this agreement is to be signed by an authorised representative of the Trial Airfield and returned to Airspace4All prior to the commencement of the Trial.

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1) The equipment loaned to the airfield remains the property of Airspace4All and will be returned to Airspace4All at the end of the trial or upon request from Airspace4All within one month.

2) The airfield ATS Unit will take good care of the loaned equipment to ensure it is not damaged, lost or stolen.

3) The airfield ATS Unit will provide all other IT equipment as described in the Trial Safety Plan required to facilitate the operation of the Traffic Display in a timely fashion.

4) The airfield ATS Unit will install, setup and use the loaned equipment in a timely fashion in line with manufacturer's instructions and instructions provided by Airspace4All.

5) The airfield ATS Unit will comply with all requirements specified in the Trial Safety Case Report and the Trial Safety Plan and ensure all ATS Staff are trained to understand their responsibilities.

6) In association with Airspace4All, the airfield ATS Unit will assist with the roll-out of loaned skyEcho portable ADS-B transceivers to a limited number of aircraft operators (participants) based at their airfield by:

- Identifying/selecting appropriate candidates;
- Briefing candidates on their requirements and responsibilities;
- Handing out and collecting the skyEcho ADS-B transceivers, and maintain a record thereof.
- Ensuring participants understand and sign their skyEcho ADS-B transceiver loan agreement.

7) The airfield ATS Unit will provide a sufficient supply of printed Trial feedback forms, ensure all ATS Staff complete the Trial feedback forms regularly and in a timely fashion, store completed forms safely and return completed forms to Airspace4All each month. Or alternatively, ensure same via internet forms, if available.

8) The Airfield and ATS Staff are responsible for providing services which are in accordance with the privileges of their licence. Participating in the trial does not affect the ATS license privileges granted by the CAA to the airfield or ATS Staff.

9) The airfield ATS Unit will facilitate and cooperate with any airfield site visits by Airspace4All and/or CAA.

Airfield:			
Signed:		Name:	
Position:		Date:	

APPENDIX B Letter Of Agreement (Participant)

Letter of agreement between Airspace4All and aircraft operators for the Airspace4All GA Airfield ADS-B Traffic Display Trial. A copy of this agreement is to be signed by an authorised representative of the aircraft operator and returned to Airspace4All prior to participating in the Trial.

1) The equipment loaned to the participant remains the property of Airspace4All and will be returned to Airspace4All, via the Airfield ATS Unit, at the end of the trial or upon request from Airspace4All or the Airfield ATS Unit within one month.

2) Participant will ensure all pilots who use the equipment understand their responsibilities under this agreement and will comply with the agreement.

3) The participant/pilot will take good care of the loaned equipment to ensure it is not damaged, lost or stolen.

4) The participant/pilot will install, setup and use the loaned equipment in a timely fashion in line with manufacturer's instructions and instructions provided by Airspace4All and will use their best endeavours to maximise use of the equipment.

5) If the aircraft is equipped with a Mode S transponder the participant will follow instructions from the CAA with regard to the waiver to the current restriction of the simultaneous use of a Mode S transponder and a CAP1391 ADS-B transceiver. The participant/pilot will cease use of the ADS-B transceiver immediately if requested to do so by the CAA, Airspace4All or the Airfield ATS Unit the participant

6) The participant/pilot may utilise the ADS-B In capabilities of the equipment but acknowledges that this capability is outside the scope of the trial. It is the responsibility of the participant to provide and configure additional equipment to display ADS-B In traffic information.

7) The participant/pilot will comply with all requirements of the Trial Safety Case Report and the Trial Safety Plan and ensure all pilots are trained to understand their responsibilities.

8) The participant/pilot will provide feedback on their experiences of the trial in the forms requested by Airspace4All and/or CAA.

9) Participating in the trial does not alter the pilot's responsibilities for safe flight.

10) The participant/pilot will endeavour to cooperate with any requests received from Airspace4All and/or CAA.

Organisation:			
Address:			
Telephone:		Email:	
Aircraft Reg:		ICAO Hex ID:	
Signed:		Name:	
Position:		Date:	

APPENDIX D ATS Staff Duty Period Feedback Form

Airspace4All GA Airfield ATS ADS-B Traffic Display (TD) Trial Staff Duty Period Feedback Form	
	Please can each ATS staff member complete a copy of this form at the end of each duty period.
Name	
Airfield	
Date	**Duty Period Start Time (z)**	**Duty Period End Time (z)**

	Please provide a brief description of any traffic situations that arose during the duty period upon which the TD had a positive or negative bearing. Please include the time of any incident.
Situation	

Please provide feedback on the following statements by ticking the appropriate box:	strongly agree	agree	neutral	disagree	Strongly disagree	N/A
The TD was fully operational for the entire duty period.						
The TD distracted me from my core tasks.						
The TD alerted me to inaccurate position reports.						
The TD provided improved situational awareness of aircraft ground movements.						
The TD provided improved situational awareness of aircraft in/joining/leaving the circuit.						
The TD provided info on some relevant traffic that was not on my frequency.						
The TD provided info that helped to address aircraft infringing CAS or about to do so.						
The TD provided info that assisted in confirming aircraft complied with local traffic regulations.						
An aircraft was observed on the TD to appear, disappear then re-appear while remaining within typical operational range.						
The TD provided me with situational awareness that enabled a safer service.						
TD information prevented a safety related incident. (If so, pleases provide further detail in comments)						
The absence of non-ADS-B traffic negated any benefits of the TD.						

	Please provide further comment below, if required. Please elaborate on any of the answers above or add further comment on the operation of the TD during your duty period.
Comments	

APPENDIX M ATS Staff Monthly Feedback Form

Airspace4All GA Airfield ATS ADS-B Traffic Display (TD) Trial Monthly Feedback Form		
	Please can each ATS Staff member complete this form at the end of each calendar month.	
Name		**Date**
Airfield		

How effective was the range and reception of TD system?	
How did the absence of non-ADS-B traffic from the TD affect your use of the system?	
How would you assess the contribution made by the TD to your suite of support tools?	
How would you assess the TD screen presentation (maps, background, traffic, supporting data) ?	
Overall, do you feel the TD is enhancing your situational awareness? Please give rationale:	
Would you support the retention of the TD after the end of trial period?	
Are there any system enhancements you would like to see?	
Do you have any further comments regarding the trial and the TD system?	

Airspace4All Ltd, 31 Walker Avenue, Wolverton Mill East, Milton Keynes, MK12 5TW

APPENDIX S skyEcho Loan Register

Each Trial Airfield ATS Unit to maintain a copy of the skyEcho Loan Register

skyEcho Wireless Network Name	A/C Registration	A/C ICAO 24 bit Address (HexID)	A/C Type	A/C Owner	A/C Owner Contact Details		Date Loan Agreement Signed signed	Date unit returned to ATS
					telephone	email		

Airspace4All Ltd, 31 Walker Avenue, Wolverton Mill East, Milton Keynes, MK12 5TW

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Airspace4All Ltd, 31 Walker Avenue, Wolverton Mill East, Milton Keynes, MK12 5TW