

Stevens Mark

From: [REDACTED]@dft.gov.uk>
Sent: 23 April 2020 15:35
To: [REDACTED]
Cc: [REDACTED]
Subject: EC Devices fund
Attachments: Annex A EC Grant letter CAA Proposal.pdf; Draft S.12 Letter EC Resource funding 20 21.docx

Hi both,

I have now returned to BAU work from COVID and we very much have the green light to resume work on EC including the grant scheme.

We are content with the IT proposal as you recommend – with thanks for the revisions to the earlier version. Therefore we are nearly ready to issue a S.12 letter so work on the portal can begin. I attach a draft and would welcome comments/ suggested amendments etc.

We will have a separate letter with the criteria for the EC devices fund. Below is where I think we had got to with this. Could I invite the CAA to come back to us in writing on any amendments to these or additional details (I recall previous discussion about defining laptops were in or out). As regards unmanned and handligers/ paragliders – anyone else we are missing. We can consider their inclusion but would need a proposal for ensuring kit goes to people flying/ based in the UK – a proxy for a pilot license.

Would you be available for a chat tomorrow between 10 – 13:00 or 15:30 – 17:00?

Criteria at present.

- *Funding for on-aircraft devices only.*
- *Applicants may claim a rebate of 50% up to £250 per aircraft for EC equipage purchased.*
- *Open to registered pilots only.*
- *Only manned aircraft will be eligible for the fund.*
- *Only equipment purchased between 1 April 2020 and 31 March 2021 will be eligible for a grant award from capital allocated to the CAA for the 2020/21 financial year.*
- *Launch of the fund should align with a communications campaign.*

Many thanks,

[REDACTED]

[REDACTED] Aviation Directorate,
Department for Transport
| [REDACTED] |

The information in this email may be confidential or otherwise protected by law. If you received it in error, please let us know by return e-mail and then delete it immediately, without printing or passing it on to anybody else. Incoming and outgoing e-mail messages are routinely monitored for compliance with our policy on the use of electronic communications and for other lawful purposes.

Stevens Mark

From: [REDACTED]
Sent: 07 May 2020 11:17
To: [REDACTED]
Cc: [REDACTED]; [REDACTED]
Subject: EC Rebate Criteria
Attachments: CAA Portal Landing Page v.05.docx

Hi [REDACTED]

Ahead of our call this afternoon please find attached current draft of the criteria text.

The document will be going through one more feedback loop internally here at the CAA but I shouldn't imagine major changes from the initial versions. The 'caveat text' we are currently working on to ensure we are clear regarding the rebate window.

Kind regards,

[REDACTED]



[REDACTED] Portfolio Delivery | Civil Aviation Authority
Aviation House, Gatwick Airport South, West Sussex, RH6 0YR | United Kingdom

[REDACTED] | [@caa.co.uk](mailto:[REDACTED]@caa.co.uk) |

Planned Absence: [REDACTED]

Caveat text:

- **Application not complete**
- **Avoka form tech coming**
- **Claimant will receive an email once Avoka up and running**
- **Once DfT decide on launch date. Date to be placed here**

Introduction

The Civil Aviation Authority (CAA) has received funding from the Department of Transport (DfT) to encourage the adoption of Electronic Conspicuity (EC) within the General Aviation (GA) community.

Commented [1]: Wording needed on UAS exclusion from DfT.

The request from DfT is to administer a rebate scheme targeting the GA sector to incentivise the purchase and carriage of an EC device. The scheme will provide to qualifying applicants producing a valid proof of purchase receipt, a 50% rebate of purchase cost (including VAT) to a maximum of £250.00 per applicant.

Commented [2]: Risks Identified and needing acceptance:

1. Selling on devices once purchased
2. Not checking the manufacturer details
3. Abusing the scheme and not using the devices.

It is hoped that the rebate scheme will target up to 10,000 General Aviation Pilots actively flying within the UK; giving an expected fund requirement from the DfT of £2.5m.

Commented [3]: I'm not sure on the effectiveness of this here and the requirement to show this.

What is Electronic Conspicuity

EC is an umbrella term for technologies that can help airspace users and air traffic services (ATS) be more aware of the contributing aircraft operating in the same piece of airspace, strengthening the principle of 'see and avoid' with the ability to 'detect and be detected'. The phrase 'EC solutions' refers to the devices, systems and infrastructure that bring these technologies to market and ensure they are interoperable. Airborne transponders, transceivers, moving map displays, air traffic data displays, ground-based antennas and satellite surveillance services are all examples of EC solutions. The information generated by EC solutions can be presented to pilots and ATS visually, audibly or both. Full adoption of EC solutions means 100% of users operating in a designated block of airspace can be detected electronically. **The intention of the funding scheme is to focus on the Airborne elements of equipment amongst the General Aviation community.**

Commented [4]: Bold for a reason?

Commented [5]: Yes, as EC can come in all forms: my understanding is that this part is focused on airborne only

Why the CAA is looking at Electronic Conspicuity

In line with its Airspace Modernisation Strategy (AMS), EC can play a vital role in three key areas:

1. Enabling the on-going modernisation of the UK's airspace structure and route network in line with other key AMS initiatives.
2. Helping to mitigate the risk of mid-air collisions in Class G, and infringements into controlled airspace.
3. Enabling the safe and efficient integration of UAS (Unmanned Aircraft System)

operations with conventional air traffic.

Whilst this strategy and the technical equipment to deliver it are being developed, the CAA has recently published an AIC [AIC2019Y141](#) setting out the steps that can be made to enable 'ADS-B out' throughout the General Aviation fleet to reflect recent changes and developments from EASA and the CAAs own work.

The CAA strategy seeks to address the operating community that is not captured by the requirements of the Surveillance Performance and Interoperability-Implementing Regulation, and recommends transmission via dual frequencies - 1090MHz for GA and 978MHz on UAT for UAS, with dual receiver capability on both sectors of airspace user, allowing for rebroadcast on 978MHz thereby unlocking the potential for service such as TIS (Traffic Information Service) or FIS (Flight Information Service) B on 978MHz.

The CAA recognise that beyond the approved EC solutions available, manufacturers and the GA community have developed alternative solutions suitable for their own flying needs. The use of these technologies provides several benefits to the airspace user, however there is a need to understand the limitations of such sub-systems and who they can interact with.

The table below describes the currently most used EC technologies, and a high-level understanding of the interoperability between them. The CAA recognises that this is not a definitive list.

Conspicuity Beacons	Which traffic receivers can see them?					
	Pilot Aware	Sky Echo 2	Uncertified ADS-B in Rx	Certified ADS-B-in devices	TCAS and ACAS	FLARM
Sky Echo (SIL-1 Device)	YES	YES	YES	YES	NO	NO*4
ADS-B Out transponder certified GPS	YES	YES	YES	YES	YES	NO*4
ADS-B out transponder uncertified GPS (SIL 0)	YES	YES	MAYBE*5	NO*2	YES	NO*4
Pilot Aware (PAW)	YES	NO	NO	NO	NO	NO
FLARM	NO*1	YES*3	NO	NO	NO	YES

*1) If You are close enough to one of PAW's up links you might see it, (Fragile Infrastructure)

*2) Certified Traffic receivers normally exclude reports from transponders & beacons set to SIL 0

*3) New development requires Sky Demon with FLARM decode license

*4) ADS-B in is an additional cost option to Power FLARM only

*5) Transponders or beacons with a non-certified GPS (SIL 0) may not be detected by a certified ADS-B in device. SIL 1 and above can be seen.

Eligibility for the scheme will be in line with DfT criteria which is expected to be:

- Funding for carry-on or aircraft-fitted devices only.
- Applicants may claim a rebate of 50% up to £250 per applicant on EC equipage purchased (one application per device).
- Open to registered pilots only (see below).
- Only manned aircraft will be eligible for the fund.
- Only equipment purchased between 1 April 2020 and 31 March 2021 will be eligible for a rebate.
- Rebate will be limited to the first 10,000 applicants.

What can be purchased

It is expected that the DfT will include in the scheme all airborne equipment listed or fulfilling the function of equipment listed in the table above, all equipment that fulfils the functions described within AIC will be considered for a rebate.

Any device should be capable of transmitting in a way that allows for other airspace users to detect its location.

Who is eligible

UK based Pilots holding a:

- Private Pilot's Licence (PPL)
- National PPL (NPPL),
- Sailplane Pilot's Licence (SPL)
- Balloon Pilot's licence (BPL)
- Light Aircraft Pilot's Licence (LAPL)

Or

Active members of the BHPA – providing a valid BHPA membership number *to be developed*

BGA issued Certificate? – *to be developed*

Time lines

Hold for further info

Commented [6]: We need to be much clearer on which devices are in scope. Are we saying any device on the table is acceptable, even FLARM? We need DfT to confirm in writing.

Why is this not just ADSB-out at 1090 MHz in accordance with AIC 141/19

Commented [7R6]: to get DfT confirmation in writing on Pilot Aware and FLARM.

Commented [8]: 141/19?

Commented [9]: This feels clumsy; I would suggest – The scheme will include rebate for all airborne equipment fulfilling the function specified above; additionally, all equipment that fulfils the functions described within [AIC2019V141](#) will be considered eligible for rebate.

Commented [10]: Both organisations willing to work with the CAA on solutions for their members

Commented [11]: Can be placed in caveat text once clarity from DfT.

Stevens Mark

From: [REDACTED]@dft.gov.uk>
Sent: 11 May 2020 13:52
To: [REDACTED] Johnson Tim
Cc: [REDACTED]
Subject: GA Meeting EC 13 May

Hi [REDACTED]

With apologies for the short notice. The Transport Secretary has asked for a meeting on Wednesday (16:00 -16:45) for a briefing on Electronic Conspicuity for GA to cover:

- Criteria for the Aircraft devices grant funding.
- The CAA's proposed strategy for mandating of 1090 and 978 mhz in the medium term

I would hope to get a decision on the first and [REDACTED] and team have sent over the draft criteria to inform this but there is a link with the second. Our steer was that the SoS would welcome a discussion of the technical details

Grateful if you could confirm whether the CAA can participate in this meeting and those best placed to attend from your side. Other invitees at present are DfT officials and [REDACTED]
[REDACTED]

Thanks,

[REDACTED]

[REDACTED] Aviation Directorate
1/22-25, Great Minster House
33 Horseferry Road, London, SW1P 4DR
[REDACTED]

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Stevens Mark

From: [REDACTED]
Sent: 19 May 2020 13:28
To: Johnson Tim
Subject: FW: Roundtable with EC Thursday 15:30
Attachments: EC Strategy Brief v0.1 sw.pptx

Tim

Proposed slides ahead of our meeting this afternoon.

Thanks
[REDACTED]

From: [REDACTED]
Sent: 19 May 2020 13:24
To: [REDACTED]@caa.co.uk>; [REDACTED]@caa.co.uk>
Subject: RE: Roundtable with EC Thursday 15:30

Thanks [REDACTED] Suggest copy this to Tim J for our 5 o'clock.

[REDACTED]
[REDACTED]
Airspace, ATM & Aerodromes
Civil Aviation Authority
[REDACTED]@caa.co.uk
Mob: [REDACTED]
Tel: [REDACTED]

Due to the Covid-19 outbreak and in line with Government guidance, our staff are working from home and our offices are not currently open to walk-in visitors.

You can help us through this unprecedented time by not communicating with us via traditional post as far as possible. Instead, please email us and do not contact us by post until further notice. If you send any documents by post rather than by email, please also send copies of the relevant documents by email at the same time.

Note that all documents should be sent to us electronically.

Please see our [guidance relating to COVID-19](#) for more information.

From: [REDACTED]
Sent: 19 May 2020 13:03
To: [REDACTED]@caa.co.uk>; [REDACTED]@caa.co.uk>
Subject: FW: Roundtable with EC Thursday 15:30

Both

Suggested high level slides for Thursday, in addition to this I'm (with the help of FS and UAS teams) preparing a brief for us which explains in slightly more detail the justifications of our decisions and why certified equipment and aviation frequencies are required etc.

Thanks

From: [redacted] <[redacted]@dft.gov.uk>
Sent: 19 May 2020 10:55
To: [redacted] <[redacted]@caa.co.uk>; [redacted] <[redacted]@caa.co.uk>
Subject: RE: Roundtable with EC Thursday 15:30

Morning both,

We are asked to plan for a Thursday meeting 15:30 with draft agenda and attendees as before agreed.

Only comments from SoS on draft agenda/ attendees was:

- EASY VFR to be invited (*I will also add flylogix*)
- Update requested on whether long term decisions will be taken at the CAA Board in June (on EC).

I can speak to industry contract about their availability. Would it be possible to have a copy of any CAA slides by noon tomorrow?

Might be worth a 15 minute chat if you have time? – I am busy 11:30 – 13:00 and 15:30 – 16:00 but otherwise free today.

[redacted] Aviation Directorate,
Department for Transport
| [redacted] |

From: [redacted] <[redacted]@caa.co.uk>
Sent: 18 May 2020 15:58
To: [redacted] <[redacted]@dft.gov.uk>
Cc: [redacted] <[redacted]@caa.co.uk>
Subject: RE: Roundtable with EC Manufacturers

As promised.

[redacted] <[redacted]@flylogix.com>

[redacted]
Airspace, ATM & Aerodromes
Civil Aviation Authority
[redacted] <[redacted]@caa.co.uk>
Mob: [redacted]
Tel: [redacted]

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Note that all documents should be sent to us electronically.

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From: [REDACTED]
Sent: 18 May 2020 15:20
To: [REDACTED] [@dft.gov.uk](mailto:[REDACTED]@dft.gov.uk)>
Cc: [REDACTED] [@caa.co.uk](mailto:[REDACTED]@caa.co.uk)>
Subject: RE: Roundtable with EC Manufacturers

[REDACTED] – better UAS rep for the meeting apparently is: [REDACTED] of FlyLogix; I am seeking his contact details.

[REDACTED]

[REDACTED]

[REDACTED]
Airspace, ATM & Aerodromes
Civil Aviation Authority
[REDACTED] [@caa.co.uk](mailto:[REDACTED]@caa.co.uk)
Mob: [REDACTED]
Tel: [REDACTED]

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From: [REDACTED] [@dft.gov.uk](mailto:[REDACTED]@dft.gov.uk)>
Sent: 15 May 2020 18:33
To: [REDACTED] [@caa.co.uk](mailto:[REDACTED]@caa.co.uk)>; [REDACTED] [@caa.co.uk](mailto:[REDACTED]@caa.co.uk)>
Subject: Roundtable with EC Manufacturers

Hi both,

I have proposed the attached agenda/ attendees for a wider roundtable with industry, no date set as yet.

[REDACTED]

Stevens Mark

From: [REDACTED]
Sent: 27 May 2020 16:51
To: [REDACTED]
Cc: [REDACTED]; [REDACTED]; [REDACTED]; [REDACTED]
Subject: EC Rebate Criteria/ Landing Page text
Attachments: CAA Portal Landing Page v.06.docx

Hi [REDACTED]

Please find attached the latest version of the criteria text for EC Rebate - we have begun shaping the UAS inclusion within the document.

I would welcome your feedback on the content at this stage.

Kind regards,

[REDACTED]



[REDACTED] Portfolio Delivery | Civil Aviation Authority
Aviation House, Gatwick Airport South, West Sussex, RH6 0YR | United Kingdom
[REDACTED] | [REDACTED] | [REDACTED] [@caa.co.uk](mailto:[REDACTED]@caa.co.uk) |
Planned Absence: [REDACTED]

Introduction

The Civil Aviation Authority (CAA) has received funding from the Department of Transport (DfT) to encourage the adoption of Electronic Conspicuity (EC) within the General Aviation (GA) and Unmanned Aircraft Systems (UAS) communities.

The scheme will provide to qualifying applicants producing a valid proof of purchase receipt, a 50% rebate of purchase cost (including VAT) to a maximum of £250.00 per applicant.

It is intended that the rebate scheme will target up to 10,000 General Aviation and UAS Pilots actively flying within the UK.

What is Electronic Conspicuity

EC is an umbrella term for technologies that can help airspace users and air traffic services (ATS) be more aware of the contributing aircraft operating in the same piece of airspace, strengthening the principle of 'see and avoid' with the ability to 'detect and be detected'. The phrase 'EC solutions' refers to the devices, systems and infrastructure that bring these technologies to market and ensure they are interoperable. Airborne transponders, transceivers, moving map displays, air traffic data displays, ground-based antennas and satellite surveillance services are all examples of EC solutions. The information generated by EC solutions can be presented to pilots and ATS visually, audibly or both. Full adoption of EC solutions means 100% of users operating in a designated block of airspace can be detected electronically. **The intention of the funding scheme is to focus on the Airborne elements of equipment amongst the General Aviation and Unmanned Aircraft Systems community.**

Why the CAA is looking at Electronic Conspicuity

In line with its Airspace Modernisation Strategy (AMS), EC can play a vital role in three key areas:

1. Enabling the on-going modernisation of the UK's airspace structure and route network in line with other key AMS initiatives.
2. Helping to mitigate the risk of mid-air collisions in Class G, and infringements into controlled airspace.
3. Enabling the safe and efficient integration of UAS operations with conventional air traffic.

Whilst this strategy and the technical equipment to deliver it are being developed, the CAA has recently published an AIC [AIC2019Y141](#) setting out the steps that can be made to enable 'ADS-B out' throughout the General Aviation fleet to reflect recent changes and developments from EASA and the CAAs own work.

Commented [2]: Risks Identified and needing acceptance:
1. Selling on devices once purchased
2. Not checking the manufacturer details
3. Abusing the scheme and not using the devices.

Commented [3]: Bold for a reason?

Commented [4]: Yes, as EC can come in all forms, my understanding is that this part is focused on airborne only

The CAA strategy seeks to address the operating community that is not captured by the requirements of the Surveillance Performance and Interoperability-Implementing Regulation, and recommends transmission via dual frequencies - 1090MHz for GA and 978MHz on UAT for UAS, with dual receiver capability on both sectors of airspace user, allowing for rebroadcast on 978MHz thereby unlocking the potential for service such as TIS (Traffic Information Service) or FIS (Flight Information Service) B on 978MHz.

The CAA recognise that beyond the approved EC solutions available, manufacturers and the GA community have developed alternative solutions suitable for their own flying needs. The use of these technologies provides several benefits to the airspace user, however there is a need to understand the limitations of such sub-systems and who they can interact with.

The table below describes the currently most used EC technologies, and a high-level understanding of the interoperability between them. The CAA recognises that this is not a definitive list.

Conspicuity Beacons	Which traffic receivers can see them?					
	Pilot Aware	Sky Echo 2	Uncertified ADS-B in Rx	Certified ADS-B-in devices	TCAS and ACAS	FLARM
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ADS-B Out transponder certified GPS	YES	YES	YES	YES	YES	NO*4
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FLARM	NO*1	YES*3	NO	NO	NO	YES

*1) If You are close enough to one of PAW's up links you might see it, (Fragile infrastructure)

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*5) Transponders or beacons with a non-certified GPS (SIL 0) may not be detected by a certified ADS-B in device. SIL 1 and above can be seen.

Eligibility for the scheme

- Funding for carry-on or aircraft-fitted devices only.
- Applicants may claim a rebate of 50% up to £250 per applicant on EC equipage purchased (one application per device).
- Open to registered GA pilots (see below).
- Open to registered UAS operators in specific certified categories (see below).
- Only equipment purchased between 1 April 2020 and 31 March 2021 will be eligible for a rebate.
- Rebate will be limited to the first 10,000 applicants.

Commented [5]: I would suggest to add another line for UAS saying "Open to registered operators in specific and certified category. "Open to registered pilot" can cause confusion in UAS world, that could mean every remote pilot who is registered, including Open category. There are currently 140,000+ UAS registration.

What can be purchased

The scheme will include rebate for all airborne equipment fulfilling the function specified above; additionally, all equipment that fulfils the functions described within [AIC2019Y141](#) will be considered eligible for rebate

Commented [6R5]: I agree we need to be clearer regarding UAS and GA pilots, maybe emphasize its the Categories above and those working towards a UAS BVLOS drone integration in class G

Who is eligible

UK based Pilots holding a:

- Private Pilot's Licence (PPL)
- National PPL(NPPL)
- Sailplane Pilot's Licence (SPL)
- Balloon Pilot's licence (BPL)
- Light Aircraft Pilot's Licence (LAPL)

Or

Active members of the BHPA – providing a valid BHPA membership number *to be developed*

BGA issued Certificate? – *to be developed*

UAS operators who hold permission (standard, non-standard and exemption) to operate in specific and certified categories.

Commented [7]: Both organisations willing to work with the CAA on solutions for their members

Time lines

Hold for further Info

Commented [8]: Can be placed in caveat text once clarity from DfT.

June 2020 CAA Board

Purpose

Paper seeks support from the Board for plans to progress towards **a general equipage mandate for all users effective from 2024** operating in UK airspace to adopt devices that transmit (EC) information to a common technical standard and on a protected portion of the radio frequency spectrum.

June 2020 CAA Board

The paper provides the Board with an update on:

- The outcomes of widespread engagement with aviation stakeholders on the proposal for a rolling programme of location specific EC mandates in targeted blocks of airspace, as a precursor to the general equipage mandate
- The development of the technical and spectrum standards that EC devices should meet to comply with the general equipage mandate; and
- **The proposed scope, timelines and approach to implementation of the general equipage mandate** for EC adoption.

EC Strategy

EC deployment vision by January 2024:

- Where required, every airborne vehicle and system in UK airspace will **broadcast a standard EC transmission on one of two common frequencies that are protected and reserved for aviation**; and
- A mature and competitive market for airborne and ground-based solutions exists that allows airspace users, and air traffic services, to make cost-effective decisions about how they receive and use EC information to enhance the safety, efficiency and integration of aviation operations.

EC Strategy

The EC vision continues to support the achievement of three related objectives:

Objective 1: to enable the safe efficient integration of unmanned aircraft systems (UAS) within UK airspace;

Objective 2: help mitigate the risks of mid-air collision (MAC) in the UK; and

Objective 3: enable the on-going modernisation of the UK's airspace structure and route network in line with the CAA's Airspace Modernisation Strategy (AMS)

June 2020 CAA Board

The CAA Board is requested to support the plans to progress with a general equipage mandate, including:

- The production of detailed guidance on the technical and spectrum standards that the general equipage mandate will require and the approach to integrating existing EC devices.
- The production of a full **Regulatory Impact Assessment (RIA) and Business Impact Assessment (BIA)** in support of the general equipage mandate.
- Definition of a detailed approach to checking users' compliance with the terms of the mandate, conducting enforcement actions in the case of non-compliance and managing exemptions as appropriate

ExCo Paper

Paper Number 54-2020

03 June 2020

Paper category: **Infrastructure optimisation**

Board direction to implement a general EC equipage mandate

Report by: [REDACTED], [REDACTED] and [REDACTED]

Paper sponsor: Rob Bishton

Paper for: Approval

Headline purpose

This paper seeks confirmation that the CAA Board is minded to:

Implement a general mandate for all users of U.K. airspace to equip with and use devices that transmit Electronic Conspicuity (EC) information. It is proposed that the intention to implement a general EC equipage mandate be published in Q2/2020 and that the mandate will come into force on January 1st 2024.

To support the implementation of the mandate the CAA must:

- Set out the technical and radio frequency spectrum standards that EC devices should meet in order to comply with the terms of the mandate ensuring interoperability;
- Establish the approach to checking users' compliance with the terms of the mandate, enabling enforcement actions in the case of non-compliance and managing exemptions where applied.
- Finalise the Regulatory Impact Assessment for the mandate that is attached at draft to this paper in Annex A.



Issue and background

Issue

The CAA should formally establish the legal requirement for all users operating in the U.K. airspace to equip with and use devices that transmit Electronic Conspicuity (EC) information, to a minimum technical standard, and confirm the timelines for this requirement to come into force. This paper seeks approval from the Board for the requirement to be conveyed in the form of a general EC equipage mandate, published in Q2-2020 and effective from January 1st 2024. Many airspace users (with aircraft weighing more than 5700kg) are already legally required to transmit EC information, using 'ADS-B Out' (Automatic Dependent surveillance – Broadcast) transponders, under the terms

of new European surveillance rules that come into force in June 2020.¹ A general EC equipage mandate for the U.K. is needed to provide those airspace users that are not covered by the terms of the European rule with the necessary certainty to plan their investment in compliant EC devices.

Feedback from stakeholders engaged during the Share the Air conference in January 2019 highlighted the importance of all airspace users transmitting EC information to a common and interoperable standard as an enabler for the benefits that could be delivered. A general equipage mandate will cover the technical standards of the emission requirements to enable lawful compliance, and the associated sanctions regime to ensure compliance.

The technical standards for the general equipage mandate will align with the European rule to ensure maximum interoperability by requiring the transmission of EC information using ADS-B technology, forming part of the enabling solution to Beyond Visual Line of Sight (BVLOS) drone integration within uncontrolled airspace. To manage the availability of the limited portion of radio frequency spectrum that ADS-B devices use, it is envisaged that General Aviation (GA) users will be required to broadcast EC transmissions using 1090MHz, Low level Unmanned Aircraft System (UAS) operators will be required to broadcast using 978MHz and all users will be encouraged to carry dual receivers to realise the full benefit.

Air traffic services (ATS) and airspace change sponsors (typically airports or ATS providers) are also seeking clarity on EC equipage requirements in the U.K so that they can develop their future operating concepts and airspace change plans based on the assurance that there will be a full known environment supported by electronic surveillance data. The manufacturers of the EC devices have indicated that establishing the formal requirement and technical standards for EC equipage applicable to all users in U.K. airspace will help them to develop innovative and cost-effective products that meet the demands of all sections of the user market.

The proposed use of dual frequencies with dual receiver capability for both sectors of airspace user, opens the potential for ground based rebroadcast on 978MHz thereby unlocking the market for rebroadcast services. This mechanism involves the use of a receiver on the ground detecting traffic in the vicinity and re broadcasting its position to other aircraft, thereby enabling greater awareness of those operating nearby. Other services can be added to the rebroadcast, such as weather and aerodrome status to improve the pilots air picture. These 'add-ons' are known as TIS-B (Traffic Information Service-Broadcast) and FIS-B (Flight Information Service-Broadcast). Both these services have been identified as a means to provide significant additional benefits to the GA community, whilst we are not looking to mandate such services at this stage, industry has already proven itself to be keen to develop such systems, the CAA would work with industry to further encourage this aspect.

Ground based rebroadcasting systems such as this can, in such time before a general mandate, also be used to detect and rebroadcast unlicensed/uncertified systems, adding a short-term situational awareness benefit to the GA community. This form of rebroadcast does not provide sufficient integrity to meet the longer term needs of BVLOS drone integration but can deliver a short-term benefit and means of encouraging voluntary adoption before a general mandate.

Background

The UK's airspace is getting busier because commercial air transport operations are growing (from 2.2m flights in 2019 to more than 3m expected by 2030 – notwithstanding the current flattening of the growth curve driven by COVID-19), the GA sector is thriving and the market for UAS operations is expanding rapidly (by c.12% per year). A general equipage mandate for all users to transmit EC information to a minimum standard is necessary to integrate more traffic into the finite volume of U.K. airspace both safely and efficiently. In its basic form an EC transmission broadcasts data about an aircraft's position, trajectory and speed. Some EC devices also receive data and present it to the pilot (either visually or audibly) to improve their situational awareness. Devices used by ATS on the ground to receive EC information can improve their awareness of the evolving traffic situation, and also rebroadcast such information to a wider mix of users, increasing coverage and offering other integrated services (like weather information). In Class G (Uncontrolled) airspace, where users can

¹ Commission Implementing Regulation 1207/2011 and subsequent amendments require that all aircraft with a certificated take-off mass greater than 5,700 kg and/or with a maximum true air cruising speed greater than 250 knots will be compliant with ADS-B Out requirements in support of ground and airborne surveillance applications by June 2020.

operate to visual flight rules on the principle of 'see and avoid', the requirement for all users to equip with devices that transmit EC information will allow aircraft to 'see, be seen and avoid' other traffic in a full known environment enabled by electronic surveillance data.

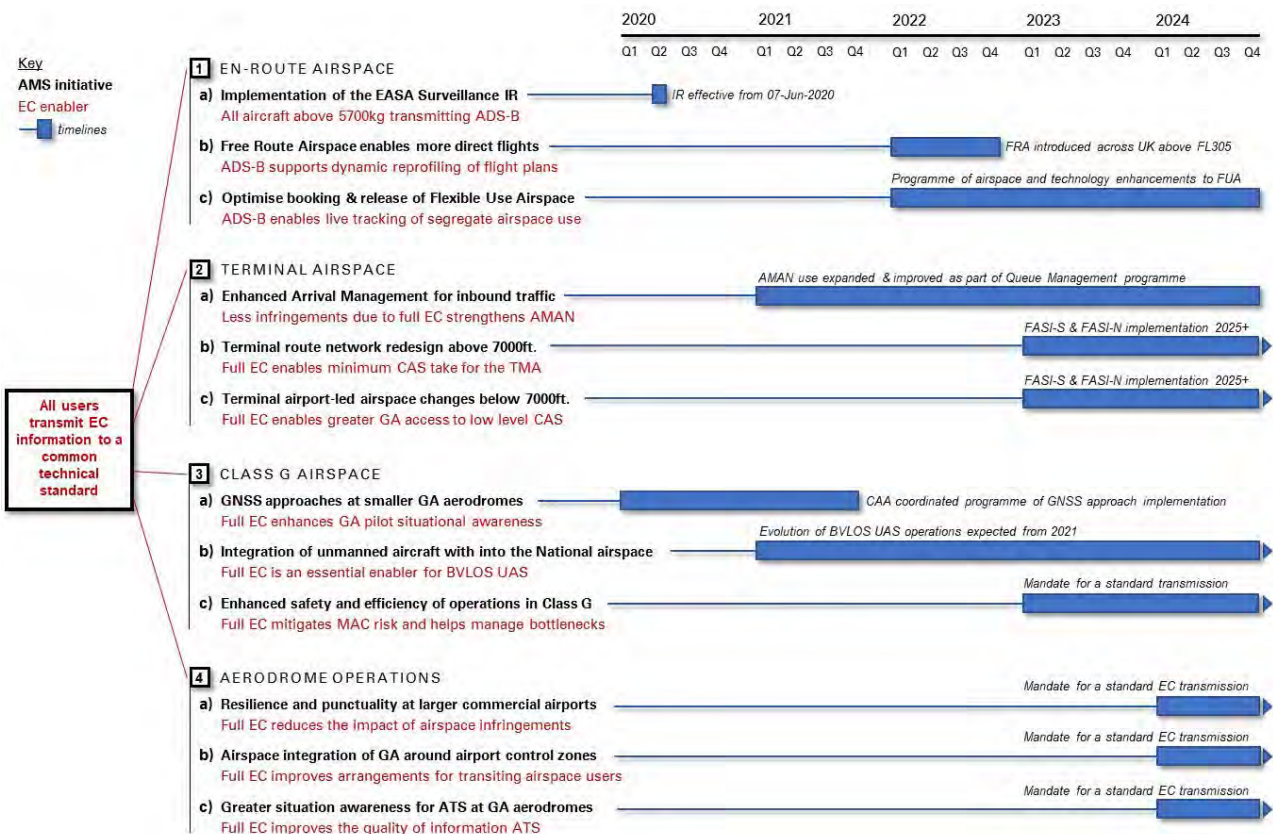
CAA Strategic Priorities:

The creation of a fully known airspace environment supported by electronic surveillance data is one of the most important initiatives in the U.K. Airspace Modernisation Strategy (AMS) as it serves three key objectives:

1. Enabling the on-going modernisation of the UK's airspace structure and route network in line with other key AMS initiatives.
2. Helping to mitigate the risk of mid-air collision in Class G, and infringements into controlled airspace.
3. Enabling the safe and efficient integration of UAS operations with conventional air traffic.

The CAA expects significant safety, efficiency and economic benefits to be generated by the requirement for all users to transmit EC information to a common standard. From a safety perspective it will help to mitigate the risk of mid-air collision in Class G airspace and infringements into higher classifications of (controlled) airspace. From an efficiency perspective, it will enable different users to better integrate their operations in the same geographical area effectively, without the need for segregation and limitations on airspace access. Airspace integration is a key enabler for other important AMS initiatives, such as the redesign of the terminal route network. Also, some smaller aerodromes that operate into Class G without the support of a radar can rely on the full known environment to expand the type of services they may offer users and at a more affordable cost. It is envisaged that UAS operators will rely on the full known-environment supported by electronic surveillance to detect all other airspace users remotely or automatically using connected technologies and deliver a wide range of new products and services while integrating fully with conventional air traffic.

The chart below summarises how a general equipage mandate for all users to transmit EC information to a minimum technical standard, which is effective from January 1st 2024, enables a wide range of AMS initiatives in the en-route, terminal and Class G airspace, and within aerodrome operations.



Options and Recommendations

Options

At the November 2018 CAA Board, the then Group Director of Safety and Airspace Regulation presented a paper which proposed that because EC is deemed a key enabler to unlock safety benefits, accommodate better airspace sharing, and integrate GA and UAS users, the CAA should require all users operating in UK airspace to adopt EC devices. The paper suggested that this requirement should, in the short-term, be addressed by a rolling programme of location specific EC mandates in targeted blocks of airspace where the benefits are at their greatest. A general EC equipage mandate was considered as the culmination of the rolling programme of location specific airspace mandates.

In response, the Board confirmed the following after the November 2018 meeting, that:

- The CAA should require all users of U.K. airspace transmit EC information to a minimum technical standard.
- The mandate(s) for this requirement should not advocate for a particular technology or supplier of technology, but should recognise that:
 - I. any technology used must be fully interoperable to enable users to 'see, be seen and avoid' all others through electronic means; and
 - II. due to the size of the global market and the EASA equipage mandate for larger aircraft, ADS-B enabled and interoperable solutions are likely to be the most commonly adopted technology.
- The timelines for the general EC equipage mandate will be influenced by the availability and cost of compliant devices, the pace of voluntary adoption across that section of users not covered by the new European rules and, the development of ground-based infrastructure.

Since the Board direction provided in November 2018, the CAA has examined the three main options for all users to transmit EC information to a minimum technical standard:

1. Continue to encourage the voluntary adoption of compliant EC devices across all users – Voluntary Adoption.
2. Implement a rolling programme of location specific EC mandates in targeted blocks of airspace – Rolling Programme.
3. Implement a general equipage mandate for all users to transmit EC information – General Equipage Mandate.

Please note: CAA SMEs are in discussion with counterparts in the DfT, and the Secretary of State, who wish to explore wider options including the potential benefits that could be gained through funded development of uncertified ground-based infrastructure and associated airborne equipment.

Table 1 summarises the key considerations and recommendation associated with each option.

#	Option	Key considerations
1	Voluntary Adoption	<p>Many airspace users and some ATS providers have voluntarily invested in EC devices because they are attracted by the benefits. A formal legal requirement to invest in EC devices, over and above individual incentive, is needed to ensure that the creation of a full known environment supported by electronic surveillance data is achieved for two reasons:</p> <ul style="list-style-type: none"> • Without a formal legal requirement on all users to invest in compliant EC devices, within a prescribed timeframe, it may be many years before a full known environment is achieved. If a full known-environment is to be achieved voluntarily, it will be difficult for stakeholders to pinpoint exactly when this will happen and develop their operations/airspace changes accordingly to realise the benefits. There is also a risk that even once a full known-environment is established, it may be lost again if there is no formal legal requirement for users to maintain the transmission of EC information to a minimum technical standard.

		<ul style="list-style-type: none"> Voluntary investments in EC devices are driven by the specific benefits that they deliver to the users who buy them. These benefits vary by stakeholder group. Glider pilots are incentivised to invest in EC devices for different reasons to powered aircraft private pilots; the incentive for UAS operators is different again. Manufactures tailor their products to maximise the potential benefits for each individual stakeholder group, thereby strengthening the incentive to invest. This market driven model is likely to generate effective solutions to meet the demands of individual user groups, but the incentive to ensure interoperability across all devices and users is less obvious. The benefits of interoperability are derived from improvements in safety, efficiency, access and capacity that are distributed across all airspace users; these are systemic, network wide benefits, that do not fall to any one user group, so are unlikely to be in demand when individuals are investing voluntarily. <p>Recommendation: A regulatory intervention to compel users to transmit EC information to a minimum technical standard is needed to ensure that full known environment is achieved and maintained in a prescribed timeframe that stakeholders can plan investment towards.</p>
2	Rolling Programme of location specific mandates	<p>Location specific mandates that focus on blocks of airspace are intended to target areas where EC information has the greatest potential to deliver benefits. Over time, a programme of well-coordinated, location specific mandates might create the same widespread, network level changes delivered by a general equipage mandate.</p> <p>However, airspace users and ATS providers considered the proposal for location specific mandates to be overly complex. To be effective, each location specific mandate would need to include the requirements to transmit, receive and rebroadcast EC information. Stakeholders felt that the CAA should not set specific requirements on specific airspace users or ATS to receive and use/rebroadcast EC information because the market is sufficiently competitive and innovative to provide the right incentives for users to invest appropriately in these areas depending on their needs.</p> <p>Stakeholders were also concerned that the implementation of location specific mandates that focus on targeted blocks of airspace would require Airspace Change Proposals (ACPs) to implement. The timescales, costs and risks associated with completing the ACP process has the potential to deter stakeholders from participating in the generation of location specific mandates.</p> <p>The business case for stakeholders to participate in the implementation of location specific mandates is also undermined by a lack of certainty about the requirement for all users to adopt EC devices at a national level, an issue which would be addressed by a general equipage mandate.</p> <p>Recommendation: Providing there is a baseline of all users transmitting EC information to a minimum technical standard, then additional requirements in targeted blocks of airspace to receive and use/rebroadcast EC are not considered necessary at this stage.</p>
3	General Equipage Mandate	<p>A general EC equipage mandate applicable to all users is broad enough scope to enable the achievement of the three objectives of full EC adoption. A general mandate is simpler in nature because it only includes the requirement to transmit EC information to a common standard (operators should make commercial decisions about the solutions that receive and rebroadcast EC information). Manufactures of equipment have also indicated that without a general equipage mandate the business case for developing cost effective devices at the scale required by 2024 is not feasible.</p> <p>The options around the specific mechanism for mandating will require more detailed consideration following board agreement on the proposed approach. In general terms the options would be either an amendment to the Air Navigation Order (ANO), or by the CAA issuing various directives capturing specific groups of airframes.</p>

		<p>Recommendation: The CAA should formally establish the legal requirement for <u>all users</u> operating in the U.K. airspace to transmit EC information to a <u>minimum technical standard</u> and confirm the timelines for this requirement to come into force. This requirement should be conveyed in a general equipage mandate that is published during Q3/2020 and effective from January 1st 2024. The specific mechanism for enacting the mandate should be worked through in the following 6 months and publicized as soon as practicable. Stakeholders should take commercial decisions regarding the additional devices they invest in to receive and use EC information based on their operational needs.</p>
<p><i>Table 1: Options and recommendations for all users to transmit EC information</i></p>		

Risks

Three important risks associated with the general EC equipage mandate have been identified as needing to be managed through the implementation phase.

Spectrum supply risk:

Because the availability of the protected portion of radio frequency spectrum that is used by aviation stakeholders to transmit ADS-B (1090MHz) is limited, there is a risk that the general EC equipage mandate creates a surge in demand for spectrum that cannot be accommodated, leading to gaps in the ability to create a full known environment as the spectrum becomes saturated. Consideration was given to the use of non-aviation protected spectrum, but such unassigned frequency bands offer no assurance against degraded performance, interference (deliberate or otherwise) or the reallocation of the frequency to other non-aviation applications. Users of EC devices that rely on unassigned frequency bands subject themselves to the safety risks that the electronic surveillance data is unverified, and the devices are not built to known minimum standards. Incorporation of such emitted data becomes a safety risk in itself, particularly if then utilised by ground surveillance infrastructure.

In responses to the potential risks associated with the supply and demand of 1090MHz spectrum, the CAA engaged a technical specialist (QinetiQ) to model the impact of a general equipage mandate in one of the UK's spectrum congestion hotspots. The modelling took potential busy day scenarios provided by GA organisations and added them to existing data across all airspace users. The results showed that the risk of spectrum saturation has a low impact on the plans to implement a general equipage mandates, providing a majority of compliant devices are sufficiently low power (c.20W – which will become part of the proposed specification).

UAS integration risk:

The UAS integration risk is closely related to the spectrum supply risk. Given the potential high demand from the UAS sector and the finite amount of 24-bit identification addresses (required as a global standard) and spectrum availability, an alternative broadcast option is needed. This position is supported by a recent ICAO letter advising States not to apply 1090MHz spectrum to the UAS sector. When looking at international developments, it is clear that the only viable alternative with a mature technology is that used in the USA, where a second ADS-B frequency, 978MHz, has been approved by ICAO. This option has been assessed by the spectrum regulator (Ofcom) and a technical proposal on its potential use has been presented; Ofcom has agreed to our request, and we are confirming the extent of likely use for these purposes. The general equipage mandate proposed in this paper would include all UAS operators that are subject to the remote identification regulations and fall in the Specific and Certified category.

Technical standards risk

Articulating the technical standards that EC devices should comply with as part of the general equipage mandate is niche and highly complex, there is a risk the CAA does not retain the appropriate resources to define such standards in sufficient detail to enable implementation of the mandate. The CAA had intended to secure the specialist resources needed to create the technical standards for the general equipage mandate as part of a short-term consultancy engagement during Q2-2020, potentially via Section 16 funding with the DfT. The longer-term identification and recruitment for this skillset is subject to wider resource issues, compounded by COVID-19 pressures.

Limited support for a Mandate from the General Aviation community

Whilst the General Aviation community has shown a willingness to adopt EC, it is apparent that the

appetite for a full mandate is less certain. Through further engagement with specific GA organisations, it has been identified that one of the main points for this is a lack of understanding as to how a mandate would help deliver better/more flexible airspace access. Additional work is underway within SARG to draw out the connections being made available under the Airspace Modernisation Programme to link improvements in situational awareness (for air traffic service providers) with ease of access for those wishing it. The CAA is engaging through specific working groups on Flight Information Services, Airspace Reclassification and Flexible Use of Airspace to ensure transparency and improved messaging.

Building on this, another issue raised is the perceived lack of benefit but increased cost (through equipment purchase) to the GA community, driven by pressures on capacity exerted by new users (unmanned aircraft) entering open (uncontrolled or class G) airspace. Were capacity the only issue, this might be a reasonable argument, but of course, as previously described, greater Electronic Conspicuity equipage aims to deliver 3 objectives, of which only one relates to the effects of greater numbers of users (mid-air Collisions); traffic integration, access and modernisation also being significant gains for the UK, and beneficial directly to General Aviation. Additionally, the CAA is working with the DfT to enable a refunding scheme utilising Government funds to mitigate the already reasonable cost of some Electronic Conspicuity equipment. The proposal from the CAA is considered to be 'the lowest regulatory impact possible', to mandate transmission only and allow users and the manufacturing industry to determine other aspects, such as receiver capability.

Stakeholder engagement

Internal stakeholder engagement

All areas of the Safety and Airspace Regulation Group (SARG) are engaged in the EC Deployment Programme (ECDP) that is tasked and overseen with the development and implementation of an equipage mandate by the ECDP Control Board. The Control Board meets monthly and includes representatives from AAA, The UAS team, the General Aviation Unit, CAA Corporate Communications and the Office of the General Counsel. The CAA's Strategy and Policy team and Innovation Hub are also regularly engaged in the direction of the ECDP to ensure close alignment.

External stakeholder engagement

On 18 March 2019, the CAA published "Electronic Conspicuity – a call for evidence and future plans". This call for evidence closed on 25 May 2019. 327 responses were received from across the industry. As a follow-up to the call for evidence the CAA held a conference entitled 'Share the Air' in May 2019, where EC concepts were further developed, and industry were invited to present their own views on EC. The CAA continue to engage with all potential user groups through regular meetings on the subject of EC with an established Working Group (ECWG), chaired by the CAA and comprising stakeholders and technical experts meets quarterly.

Finance and resource

The proposals to implement a general EC equipage mandate can be resourced from within the CAA's existing organisational structure and budget, and the costs for the specialist consultancy support required can be met from existing budgets and Section 16 DfT funding agreements currently under negotiation.

Central funding scheme for EC equipage

In a bid to further enhance safety within the GA community at the earliest opportunity, the DfT has provided funding of up to £2.5m to assist with the purchase of EC devices that can provide benefit to GA. For EC equipment purchases made during a limited period. The CAA will administer a fund that will reimburse against sanctioned/receipted and conforming solutions to encourage greater uptake of suitable devices contributing to the goals of full adoption, interoperability and a known environment. It is envisaged that such a reimbursement will be for 50% of the purchase cost (including VAT) to a maximum of £250 and will be attributed to a single registered pilot (single application per pilot).

Next steps and delivery

Delivering the mandate

There are three main ways for airspace users to deliver on the requirements of the proposed general equipage mandate:

- For EASA certified aircraft with a Mode S transponder that are not covered by the EASA mandate (due to weight and speed), the requirements of the general equipage mandate can be achieved by connecting a GNSS (Global Navigation Satellite System) position source to their existing transponder. New rules issued by EASA in April 2019 authorise maintenance engineers to link a GNSS source with an ADS-B capable transponder, without the need for a design approval, significantly reducing the cost of equipage.
- For aircraft operating on a Permit to Fly issues by either the British Microlight Aircraft Association (BMAA) or the Light Aircraft Association (LAA); those organisations have published detailed procedures to connect a GNSS source to an ADS-B capable transponder. There will inevitably be some technical, cost and practical restrictions for some aircraft and Government funding has been made available to help cover the cost of investing in any standard of EC device as the UK sector continues to work towards the required level of interoperability.
- For non-transponder equipped aircraft that require a carry-on conspicuity device emitting to a minimum standard, (e.g. microlights, gliders and paragliders) the CAA will work with manufactures and airspace users to develop and publish any additional or development standards during 2020.

Non-applicability and exemptions

The EC general equipage mandate is intended to apply to all users operating in U.K. airspace, however it is reasonable to assume that some criteria for non-applicability and/or exemptions may apply. It is envisaged that the aircraft categories for non-applicability will be defined as part of the process for developing the technical standards that support the general equipage mandate. The applications for exemptions will be dealt with on a case by case basis.

Next steps

A general equipage mandate with a clear timeline of January 1st, 2024 will establish the full adoption of standard EC devices in UK airspace. It will also provide those developing and using EC devices with certainty about the technical standard to which they should align their investment decisions and plan their operations. Such certainty of technical standards can then be universally applied by all users. It will also help form part of the solution to enable the UAS sector to expand BVLOS operations outside segregated airspace based on a situational awareness capability that is interoperable with manned aircraft.

The CAA Board is requested to support the CAA's plans to progress with the implementation of the general EC equipage mandate, including:

- Production of detailed guidance on the technical and spectrum standards that the general equipage mandate will require and the approach to integrating existing EC devices that many users have already invested in.
- Definition of a detailed approach to checking users' compliance with the terms of the mandate, conducting enforcement actions in the case of non-compliance and managing exemptions as appropriate.
- Finalising a full Regulatory Impact Assessment (RIA) in support of the general equipage mandate.

•

PRE-SUBMISSION IMPACT CHECKLIST

CAA Risks – discussed with your team’s risk champion and against the existing risk register?

Yes

[insert: Yes/ No. If no, explain why]

Legal implications – has OGC been included in the recommendation and do they support it?

Yes

[insert: Yes/ No. If no explain why]

Impact Assessment (IA) - Does this report create a change to legislation? If so – has the required Impact Assessment been completed and included in the paper? Yes – A revision to the ANO likely and RIA is in production.

[insert: Yes/ No. If no explain why]

Business Impact Target (BIT) - Does the proposal fall under the scope of the BIT? tbc

[insert: Yes/ No. If no explain why]

Growth Duty - How have you considered the CAA’s Growth Duty responsibilities? U/K

[insert: Yes/ No. If no explain why]

Consumer Panel - Has the Consumer Panel been consulted? If yes, what was their view? If no, why not? tbc

[insert: Yes/ No. If no explain why]

Title:	Impact Assessment (IA)
IA No:	
RPC Reference No:	
Lead department or agency:	
Other departments or agencies:	
Date: 04/04/2018 01/06/20	
Stage: Development/Options Deployment	
Source of intervention: Domestic	
Type of measure: Secondary Legislation Primary legislation	
Contact for enquiries:	

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Summary: Intervention and Options RPC Opinion: RPC Opinion Status

Cost of Preferred (or more likely) Option (in 2016 prices)			
Total Net Present Social Value	Business Net Present Value	Net cost to business per year	Business Impact Target Status Qualifying provision
£m	£m	£m	

What is the problem under consideration? Why is government intervention necessary? (7 lines max)
 When flying under VFR in class G airspace, there is no formal requirement to carry or use an electronic conspicuity (EC) device, with users relying on visual scanning or voluntarily investing in some form of transponder device.
 Mandating a standard EC transmission on a protected portion of aviation spectrum, e.g. ADS-B, will increase the quality of information available and thus increase situational awareness, mitigate against the risk of mid-air collisions (MAC) in Class G and infringements into controlled airspace, and enable the safe and efficient integration of UAS operations with conventional air traffic in line with the CAA's Airspace Modernisation Strategy. Government intervention is required to ensure there is complete uptake of a standardised EC technology by airspace users to ensure interoperability of airborne and ground based systems.

What are the policy objectives and the intended effects?
 The objective is to create a fully known airspace environment supported by electronic surveillance data in support of the "see, be seen and avoid" concept for all airspace users. This will:
 1. ~~maintain and~~ increase safety standards in uncontrolled airspace, by reducing the risk of mid air collisions, and ~~mitigating against~~ airspace infringements into controlled airspace;
 2. increase efficiency of airspace ~~use~~ by seeking to offer ~~airspace~~ users access to the airspace they require;
 3. enable greater UAS integration;
 4. provide certainty to airspace users ~~and manufacturers~~ regarding future surveillance investment requirements; and
 4.5. ~~requirements enable the provision of ancillary benefits to users, such as weather and aerodrome status.~~

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What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base) (10 lines max)
Do nothing / (i.e. allow voluntary adoption): allows airspace users to invest in EC devices voluntarily. But without a formal legal requirement or prescribed timeframe, it will take time to achieve a full known environment. This option risks the adoption of 'niche' devices that are not interoperable across all user groups.
Rolling programme of location-specific mandates: introduce a mandate which focuses on areas where EC information delivers the greatest benefits, and leave it to the market to develop the right solution. This is considered to be overly complex and ~~ewould increase potentially add complexity layers of unnecessary effort and confusion~~ to the ongoing airspace change programme.
Mandate General Equippage: Mandate the requirement ~~only etc~~ to transmit EC information to a common standard. Doing so ~~is deemed the softest regulatory intervention and will allow drive~~ the market to deliver cost effective devices and will ensure these are available at the required scale by 2024.

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Will the policy be reviewed? It will not be reviewed. If applicable, set review date: Month/Year				
Does implementation go beyond minimum EU requirements?		Yes		
Is this measure likely to impact on international trade and investment?		No		
Are any of these organisations in scope?	Micro Yes/No	Small Yes/No	Medium Yes/No	Large Yes/No
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)		Traded:		Non-traded:

I
I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible SELECT SIGNATORY: _____ Date: _____

DRAFT

Summary: Analysis & Evidence

Policy Option 1: Voluntary adoption

Description:

FULL ECONOMIC ASSESSMENT

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate:
COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Cost (Present Value)
Low	Optional		Optional		Optional
High	Optional		Optional		Optional
Best Estimate					
<p>Description and scale of key monetised costs by 'main affected groups' (5 lines)</p> <p>Costs will be dependent on the rate and scale of uptake by GA and BVLOS drone users and the impact of the uptake on market prices. With no formal mandate to adopt EC by a certain timeframe, the industry is less likely to benefit from economies of scale, and therefore the device cost may be higher under this option than for other options.</p> <p>The cost of an EC device is expected to be in the region of £500, with costs reaching up to £2000 for equipage to a full transponder depending on the level of technical specification required by for GA users, and the ability of GA users to adapt any existing kit. Drone operators can expect to pay in the region of £1800 per device while aerodromes may chose to invest in voluntary ground based kit costing in the region of £1500</p>					
<p>Other key non-monetised costs by 'main affected groups' (5 lines)</p>					
BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Benefit (Present Value)
Low	Optional		Optional		Optional
High	Optional		Optional		Optional
Best Estimate					
<p>Description and scale of key monetised benefits by 'main affected groups' (5 lines)</p> <p>n/a</p>					
<p>Other key non-monetised benefits by 'main affected groups'</p> <p>The main benefits from a voluntary approach to EC adoption will be significantly lower than other options, as there is less opportunity to benefit from network effects i.e. the benefits increase the greater the level of uptake of interoperable systems by airspace users.</p> <p>Benefits include an increase in flight safety, avoidance of MAC, enhanced opportunities for a flexible use of airspace on an "as required" basis, increased airspace access for GA and drone users, increased ground-based situational awareness, and increased cockpit situational awareness. Commercial aviation will benefit from a reduction in disruption caused by airspace infringements. Finally, aerodromes which invest in systems will benefit from a reduction in incursions and an improvement in safety where the aerodrome has no prior surveillance capacity.</p> <p>CAA and aerodromes may see a reduction in costs of reporting and investigating airspace infringements.</p>					
Key assumptions/sensitivities/risks					Discount rate (%)
<p>The scale of costs and benefits will depend on the speed of uptake, and the impact that this may have on the market value of the EC devices available to users. Voluntary uptake is likely to deliver the lowest level of benefits as operators develop their own business cases for uptake</p>					

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BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs:	Benefits:	Net:	

Summary: Analysis & Evidence

Policy Option 2: Rolling programme

Description:

FULL ECONOMIC ASSESSMENT

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate:
COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Cost (Present Value)
Low	Optional		Optional		Optional
High	Optional		Optional		Optional
Best Estimate					
Description and scale of key monetised costs by 'main affected groups' (5 lines) As per option one, the costs of the EC device will be reliant on the speed of uptake by users and the ability of the market to develop a low cost conspicuity device. As per option 1, costs for GA are expected to fall in the region of £500 - £2000; costs for BVLOS Drone operators are in the region of £1800 and, finally, costs for aerodromes which opt to invest in voluntary ground based systems will be c £1500.					
Other key non-monetised costs by 'main affected groups' (5 lines) The option to introduce location specific mandates was considered to be the most complex and could require airspace change proposals to implement.					
BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Benefit (Present Value)
Low	Optional		Optional		Optional
High	Optional		Optional		Optional
Best Estimate					
Description and scale of key monetised benefits by 'main affected groups' (5 lines)					
Other key non-monetised benefits by 'main affected groups' As per option 1, the benefits to be derived from this option will be lower than for a full mandated uptake of EC devices. However, as this option will likely target known safety hotspot areas first where EC has the greatest potential to deliver real changes, the speed and scale of benefits to be derived will be higher than for option 1 but lower than for option 3.					
Key assumptions/sensitivities/risks			Discount rate (%)		
The scale of costs and benefits will be dependent on the way in which the programme of roll out is delivered, as well as the extent to which the market develops devices that are interoperable. <u>This methodology would also perversely increase the volume of 'classified' airspace, contrary to the wishes of the DfT/Sec of State.</u>					

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs:	Benefits:	Net:	

Summary: Analysis & Evidence

Policy Option 3: Mandated uptake

Description:

FULL ECONOMIC ASSESSMENT

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate:
COSTS (£m)		Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)	
Low		Optional	Optional	Optional	
High		Optional	Optional	Optional	
Best Estimate					
Description and scale of key monetised costs by 'main affected groups' (5 lines) Total costs are to be quantified for the final stage impact assessment once full figures for the total number of users, and cost of devices have been clarified. Initial estimates indicate a one-off cost depending on preferred means equipage of around £500 - £2000 per kit for GA users not already equipped with the required device. Initial estimates suggest that there are 10,000 GA users already equipped, with c17,000 still to be equipped. The costs are higher at c.£1800 per kit for BVLOS Drone operators, with the potential to impact 10,000 to 20,000 operators. Finally, the potential cost to smaller aerodromes to adopt voluntary transponder kit is estimated to be in the region of £1500 per aerodrome based on previous CAA trial data					
Other key non-monetised costs by 'main affected groups' (5 lines)					
BENEFITS (£m)		Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)	
Low		Optional	Optional	Optional	
High		Optional	Optional	Optional	
Best Estimate					
Description and scale of key monetised benefits by 'main affected groups' (5 lines)					
Other key non-monetised benefits by 'main affected groups' The main benefits from mandating general equipage of EC for all airspace users will be an increase in flight safety, avoidance of MAC, enhanced opportunities for a flexible use of airspace on an "as required" basis, increased airspace access for GA and drone users, increased ground-based situational awareness, and increased cockpit situational awareness. Commercial aviation will benefit from a reduction in disruption caused by airspace infringements. Finally, aerodromes will benefit from a reduction in ATZ incursions and an improvement in safety (where the aerodrome has no existing surveillance capacity). CAA and airports will see a reduction in costs of reporting and investigating airspace infringement. <u>Widespread airborne equipage will encourage development and availability of 'additional' services provided via ground infrastructure: these services include weather data and aerodrome serviceability status.</u>					
Key assumptions/sensitivities/risks			Discount rate (%)		
The cost figures are based on our forecast of the potential number of GA and BVLOS drone operators to be impacted by the mandate when it comes into force in 2024, as well as the technical specification of the kit chosen by users.					

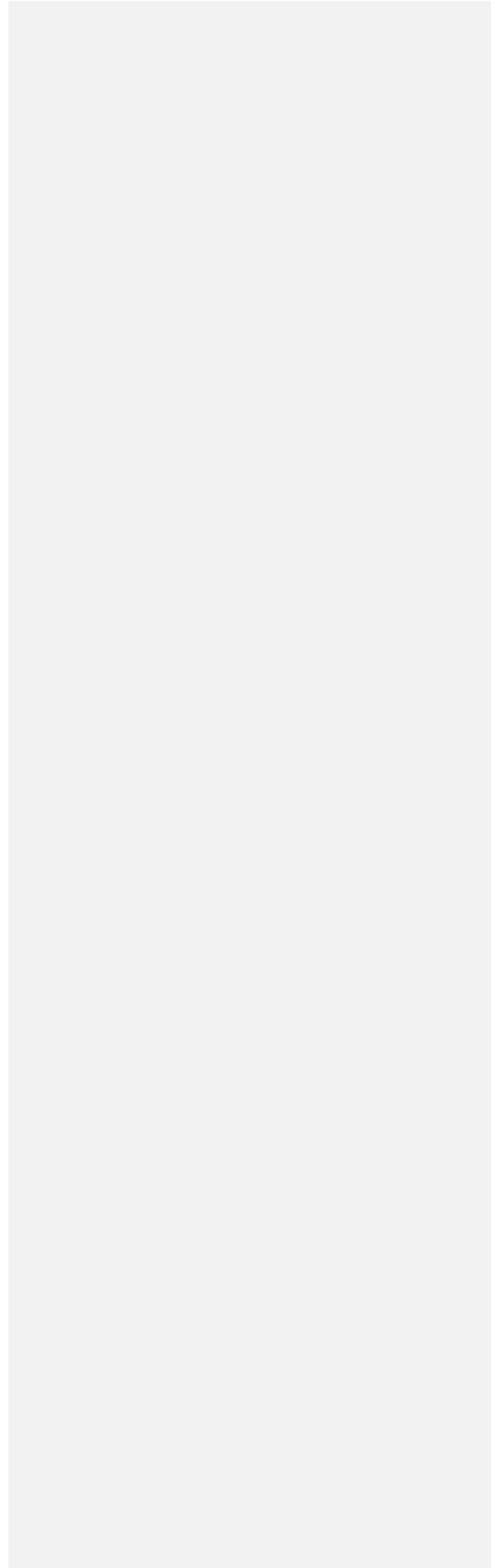
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BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs:	Benefits:	Net:	

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DRAFT



Evidence Base (for summary sheets)

- Policy objective;
- Description of options considered (including status-quo);
- Monetised and non-monetised costs and benefits of each option (including administrative burden);
- Rationale and evidence that justify the level of analysis used in the IA (proportionality approach);
- Risks and assumptions;
- Direct costs and benefits to business calculations (following BIT methodology);
- Wider impacts (consider the impacts of your proposals). Document any relevant impact here and by attaching any relevant specific impact analysis (e.g. impact on small and micro businesses, equalities, etc.) in the annexes to this template)
- A brief qualitative summary of the potential trade implications of measure. This should include an assessment of whether the measure is likely to impact on trade or investment. For further assistance and guidance please refer to DIT.
- Summary and preferred option with description of implementation plan.

TO BE COMPLETED:

This section needs to incorporate text from the CAA's AMS, evidence from the Call for Evidence and core themes of feedback received to support the problem statement and provide background for the options considered: eg

UK airspace is some of the most complex in the world, yet its design dates back to the 1950s and 1960s. Although route design has been added to and adapted in response to growing traffic levels, some routes have been little changed for decades. Accommodating the increased growth in traffic has meant adding significant complexity to the UK's airspace system. Alongside the growth in commercial traffic, the UK is seeing a continued growth in airspace demand from General Aviation users, as well as an increase in the use of unmanned aviation systems such as drones which bring with them different airspace demands.

The safe integration of such users is one of the key aspects to enable the delivery of the CAA's Airspace Modernisation Strategy (AMS), which was released in December 2018. The AMS recognised that the widespread adoption of electronic conspicuity solutions that make all aircraft more visible is needed to maintain high safety standards in uncontrolled airspace, especially around smaller aerodromes that have no surveillance capability themselves and in areas with a high density of airspace users that may be harder to see with the naked eye, such as light aircraft, gliders, hang gliders and drones.

Incorporating an ever growing mix of traffic into the UK's already complex airspace, requires advanced technological tools and air traffic solutions. In recognition of this, in March 2019 the CAA issued a Call for Evidence on proposals to mandate all electronic conspicuity stating that the widespread adoption of Electronic conspicuity (EC), where everything flying sends out an electronic signal identifying it, will be key in achieving safe and sustainable airspace for the UK in the future.

The feedback from the CAA's Call for Evidence found that there was a broad level of support within the aviation community to engage with EC. However this was qualified by the desire for any solution to be practical and to deliver value to users. The CAA stated its intention to bring forward proposals to require EC where its use reduces the likelihood of mid-air collisions and where such mid air collisions are a serious risk to those people either engaged in flying or on the ground.

This section should then set out further information here about who is captured by the CAA's proposals at a high level, e.g.

- Preferred option is to mandate the equipage of ADS-B transponders (out only) by 1st January 2024.

- Aircraft that weigh more than 5700kg are covered by EASA mandate (coming out June 2020). This proposal would capture everything else that flies below that weight. Including GA (light aircraft, gliders, balloons etc) but also Unmanned Aircraft Systems (UAS). There will be some exceptions (model aircraft, very light drones).
- Reflect that some GA users have already voluntarily invested in some form of transponder (although some are non-ADSB) but that these might no longer be compliant and may need replacing.

Options to be described with a brief overview of the pros and cons of each in terms of ability to meet the policy objectives.

Any links to costings, and any benefits analysis undertaken to support mandate

Extract from minutes of EXCO Policy Meeting, 3 June 2020

5. Board direction to implement a general Electronic Conspicuity equipage mandate (Paper Number 54-2020) by Rob Bishton

29. ExCo welcomed [REDACTED] and [REDACTED] to the meeting.
30. [REDACTED] introduced the paper and explained that the team had first presented at the Board in 2018, agreeing to design a rolling mandate for certain parts of the airspace in order to create a 'fully-known' airspace environment enabled by electronic surveillance data. The first attempt was deemed too complicated by stakeholders, so the team had designed a process that was more light touch and that could be applicable to GA and UAS alike.
31. [REDACTED] said that the team would be responsible for implementing and monitoring the process going forward, and it was planned to go live in 2024. The work had three primary aims: first, to enable the ongoing modernisation of the UK's airspace; second, to help mitigate the risk of mid-air collisions in Class G and infringements in controlled airspace; and third, to facilitate the integration of UAS operations with conventional traffic.
32. The process would require everyone to have electronic conspicuity, thus bridging the gap for the smaller airframes and compelling flyers to use protected frequencies, as per the ICAO standards. The preference would be to use existing technology with an ADB-S extension as many aeroplanes already had this and would maximise compliance and minimise cost. UAS were already enabled to receive and would be switched on to transmit imminently.
33. [REDACTED] said that the team would be looking for a 'minded to' decision from the Board and would return in the autumn to present on the progress of the implementation.
34. Richard Moriarty agreed with the approach and confirmed that at this point we should focus on delivering the process rather than questioning its motives, as these had already been set out.
35. [REDACTED] mentioned that the work highlighted the clear benefits of electronic conspicuity for aviation and explained that, due to some inactivity in the part of CAA in the past, there had not been a holistic and coordinated approach to extending conspicuity to all relevant airframes. Manufacturers had provided some solutions, to different standards, which had been adopted erratically in the sector: there were some groups of stakeholders who had already purchased a kit and were keen to adopt the process, some who questioned its application and some who had purchased kit that was now of an unsuitable standard. These differences created a risk and were the reason why complete accord between stakeholders was unlikely.
36. [REDACTED] added that, because of the part-subsidy offered by DfT, the correct kit would now be affordable and would get cheaper once the mandate had been implemented as manufacturers would try to compete with each other. However, we would require alignment with DfT on the direction of travel and government had requested some actions from CAA. First, to circulate the paper on the saturation of frequencies; second, to have our strategy peer-reviewed, for example by the FAA; and third to consult in more detail with industry.
37. Chris Tingle enquired about funding. [REDACTED] explained that the portal was likely to be complete by August and that distribution would start in September. Stakeholders would be likely to invest in models from the range that would be part-subsidised by government. [REDACTED] pointed out that this was limited to 10,250 units and that supply would be on a first come first serve basis.
38. Kate Staples commented that the key benefit of electronic conspicuity was safety, as it allowed operators to see, be seen and avoid other traffic. This should be the primary rationale driving the Board's 'minded to' decision. This approach would allow the team to then engage further with stakeholders, if necessary, to ensure that no other significant issue or aspect, not already raised or considered, had been missed. The engagement would help to conclude the very final stage of the process.

39. Rob Bishton said that a clear communication strategy was required to underline the above points, particularly on the safety benefit, to avoid stakeholders from polarising the issues with conflicting opinions. Richard Stephenson added that the team had been working with the DfT on a joint plan, however, DfT's work on this programme was currently on hold due to the crisis management.
40. Tim Johnson observed that if there were different views we should identify these and encourage government to respond appropriately if it was beyond our policy remit. On the point relating to safety, he suggested whether it might be beneficial to spend a few more months engaging with government to bridge the alignment gap and avoid potential repercussions from future decisions outside our remit.
41. Mr Moriarty praised the team for designing the process and making progress and commented that the focus now should be on liaising with all parties appropriately to reach a consensus. This included emphasising the safety benefit and reviewing the process as per the DfT's requests. The discussion with the Board should be framed on how to manage the strategy in view of a compelling safety rationale. The paper should include three key questions: first, a calibration of the different opinions on the topic; second, whether it would be a joint decision with the DfT or an individual CAA decision; and third, options on how to choreograph a plan to ensure the best decision in view of all difficulties outlined.
42. [REDACTED] and [REDACTED] agreed to tweak the paper for the Board as per the guidance provided and confirmed that a session with the NEDs had been scheduled to socialise the issue in advance of the discussion.
43. ExCo noted the update.

Board Paper

Doc 2020-52

08 June 2020

Paper category: **Infrastructure optimisation**

Board direction to implement a general EC equipage mandate

Report by: [REDACTED], [REDACTED] and [REDACTED]

Paper sponsor: Rob Bishton

Paper for: Approval

Headline purpose

This paper seeks confirmation that the CAA Board is minded to:

Implement a general mandate for all users of U.K. airspace to equip with and use devices that transmit Electronic Conspicuity (EC) information. It is proposed that the intention to implement a general EC equipage mandate be published in Q2/2020 and that the mandate will come into force on January 1st, 2024.

To support the implementation of the mandate the CAA must:

- Set out the technical and radio frequency spectrum standards that EC devices should meet in order to comply with the terms of the mandate ensuring interoperability;
- Establish the approach to checking users' compliance with the terms of the mandate, enabling enforcement actions in the case of non-compliance and managing exemptions where applied.
- Finalise the Regulatory Impact Assessment for the mandate that is attached at draft to this paper in Annex A.



Issue and background

Issue

The CAA should formally establish the legal requirement for all users operating in the U.K. airspace to equip with and use devices that transmit Electronic Conspicuity (EC) information, to a minimum technical standard, and confirm the timelines for this requirement to come into force. This paper seeks support from the Board for the requirement to be conveyed in the form of a general EC equipage mandate, published in Q4-2020 and effective from January 1st, 2024. Many airspace users (with aircraft weighing more than 5700kg and/or operating at speeds in excess of 250 knots) are already legally required to transmit EC information, using 'ADS-B Out' (Automatic Dependent surveillance – Broadcast) transponders, under the terms of

new European surveillance rules that come into force in June 2020.¹ A general EC equipage mandate for the U.K. is needed to provide those airspace users that are not covered by the terms of the European rule with the necessary certainty to plan their investment in compliant EC devices.

Feedback from stakeholders engaged during the Share the Air conference in June 2019 highlighted the importance of transmission to a common and interoperable standard as an essential enabler to deliver the benefits that could be realised. A general equipage mandate will cover the required technical standards of the emission to enable lawful compliance.

The technical standards we will produce for smaller, lighter airframes not captured by the existing EASA regulation will align with the existing European rule to ensure maximum interoperability by requiring the transmission of EC information using ADS-B capable technology; this will form part of the enabling solution to Beyond Visual Line of Sight (BVLOS) drone integration within uncontrolled airspace. To properly manage the availability of the portion of radio frequency spectrum that ADS-B devices use, it is envisaged that General Aviation (GA) users will be required to broadcast EC transmissions using 1090MHz, Low level Unmanned Aircraft System (UAS) operators will be required to broadcast using 978MHz and all users will be encouraged to carry dual receivers to realise the full benefit. We are further exploring the possibility of allowing some elements of GA who do not need access to Controlled Airspace to transmit alongside UAS on 978²MHz, further alleviating any potential strain on 1090MHz.

Air traffic services (ATS) and airspace change sponsors (typically airports or ATS providers) are also seeking clarity on EC equipage requirements in the U.K so that they can develop their future operating concepts and airspace change plans based on the assurance that there will be a full known traffic environment supported by electronic surveillance data. The manufacturers of EC devices have indicated that establishing the formal requirement and technical standards applicable to all users in U.K. airspace will help them to develop innovative and cost-effective products that meet the demands of all sections of the user market.

The proposed use of dual frequencies with dual receiver capability for both manned and unmanned sectors of airspace user opens the potential for ground based rebroadcast on 978MHz thereby unlocking the market for rebroadcast services. This mechanism involves the use of a receiver on the ground detecting traffic in the vicinity and re broadcasting its position to other aircraft, thereby enabling greater awareness of those operating nearby. Other services can be added to the rebroadcast, such as weather and aerodrome status to further improve the pilot's air picture. These 'add-ons' are known as TIS-B (Traffic Information Service-Broadcast) and FIS-B (Flight Information Service-Broadcast). Both these services have been identified as a means to provide significant additional benefits to the GA community; whilst we are not looking to mandate such services at this stage, industry has already proven itself to be keen to develop such systems, the CAA would work with industry

¹ Commission Implementing Regulation 1207/2011 and subsequent amendments require that all aircraft with a certificated take-off mass greater than 5,700 kg and/or with a maximum true air cruising speed greater than 250 knots will be compliant with ADS-B Out requirements in support of ground and airborne surveillance applications by June 2020.

² The use of 978MHz as suggested in this strategy is subject to agreement with Ofcom, this agreement is provisionally in place but requires CAA Board support for this approach before Ofcom can make steps to clear the frequency of its current users.

to further encourage this aspect.

Ground based rebroadcasting systems such as this can, in such time before a general mandate takes effect, also be used to detect and rebroadcast existing unlicensed/uncertified systems, adding a shorter-term situational awareness benefit to the GA community. This form of rebroadcast does not provide sufficient integrity to meet the longer term needs of BVLOS drone integration and access to controlled airspace but can deliver a short-term benefit and means of encouraging voluntary adoption before a general mandate.

Background

The UK's airspace is getting busier because commercial air transport operations are growing (from 2.2m flights in 2019 to more than 3m expected by 2030 – notwithstanding the current flattening of the growth curve driven by COVID-19), the GA sector is thriving and the market for UAS operations is expanding rapidly (by c.12% p.a). A general equipage mandate for all users to transmit EC information to a minimum standard is necessary to integrate increasing traffic numbers into the finite volume of U.K. airspace, both safely and efficiently.

In its basic form, an EC transmission broadcasts data about an aircraft's position, trajectory and speed. Some EC devices also receive data and present it to the pilot (either visually or audibly) to improve their situational awareness. Devices used by Air Traffic Services on the ground can improve their awareness of the evolving traffic situation, and also rebroadcast such information to a wider mix of users, increasing coverage and offering other integrated services (like weather information). In Class G (Uncontrolled) airspace, where users can operate under the principle of 'see and avoid', the requirement for all users to equip with devices that transmit EC information will enhance that principle and allow aircraft to 'see, be seen and avoid' other traffic in a full known environment enabled by electronic surveillance data.

CAA Strategic Priorities:

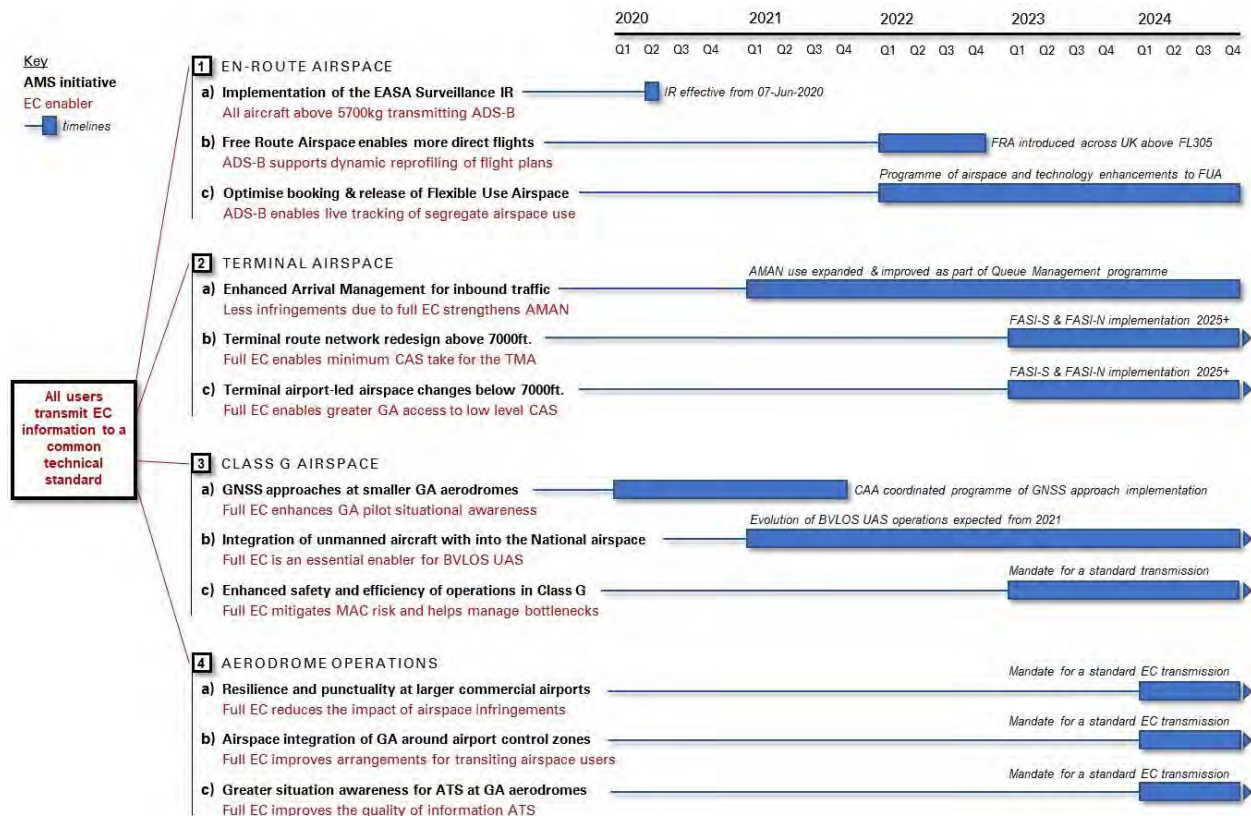
The creation of a fully known traffic environment supported by electronic surveillance data is one of the most important initiatives in the U.K. Airspace Modernisation Strategy (AMS) as it serves three key objectives:

1. Enabling the on-going modernisation of the UK's airspace structure and route network in line with other key AMS initiatives.
2. Helping to mitigate the risk of mid-air collision in Class G, and infringements into controlled airspace.
3. Enabling the safe and efficient integration of UAS operations with conventional air traffic.

The CAA expects significant safety, efficiency and economic benefits to be generated by the requirement for all users to transmit EC information to a common standard. From a safety perspective it will help to mitigate the risk of mid-air collision in Class G airspace, and infringements into higher classifications of (controlled)

airspace. From an efficiency perspective, it will enable different users to better integrate their operations in the same geographical area effectively, without the need for segregation or limitations on airspace access. Airspace integration is a key enabler for other important AMS initiatives, such as the redesign of the terminal route network. Also, some smaller aerodromes that operate into Class G without the support of a radar can rely on the full known environment to expand the type of services they may offer users at an affordable cost. It is envisaged that UAS operators will rely on the full known-environment supported by electronic surveillance to detect all other airspace users remotely or automatically using connected technologies and deliver a wide range of new products and services while integrating fully with conventional air traffic.

The chart below summarises how a general equipage mandate for all users to transmit EC information to a minimum technical standard, which is effective from January 1st, 2024 enables a wide range of AMS initiatives in the en-route, terminal and Class G airspace, and within aerodrome operations.



Options and Recommendations

Options

At the November 2018 CAA Board, the then Group Director of Safety and Airspace Regulation presented a paper which proposed that because EC is deemed a key enabler to unlock safety benefits, accommodate better airspace sharing, and integrate GA and UAS users, the CAA should require all users operating in UK airspace to adopt EC devices. The paper suggested that this requirement should, in the short-term, be addressed by a rolling programme of location specific EC mandates in targeted blocks of airspace where the benefits are at their greatest. A general EC equipage mandate was considered as the culmination of that programme.

In response, the Board confirmed the following after the November 2018 meeting, that:

- The CAA should require all users of U.K. airspace transmit EC information to a minimum technical standard.
- The mandate(s) for this requirement should not advocate for a particular technology or supplier of technology, but should recognise that:
 - i. any technology used must be fully interoperable to enable users to 'see, be seen and avoid' all others through electronic means; and
 - ii. due to the size of the global market and the EASA equipage mandate for larger aircraft, ADS-B enabled and interoperable solutions are likely to be the most commonly adopted technology.
- The timelines for the general EC equipage mandate will be influenced by the availability and cost of compliant devices, the pace of voluntary adoption across that section of users not covered by the new European rules and, the development of ground-based infrastructure.

Since the Board direction provided in November 2018, the CAA has examined the three main options for all users to transmit EC information to a minimum technical standard:

1. Continue to encourage the voluntary adoption of compliant EC devices across all users – Voluntary Adoption.
2. Implement a rolling programme of location specific EC mandates in targeted blocks of airspace – Rolling Programme.
3. Implement a general equipage mandate for all users to transmit EC information – General Equipage Mandate.

Please note: CAA SMEs are in discussion with counterparts in the DfT, and the Secretary of State, who wish to explore wider options including the potential benefits that could be gained through funded development of uncertified ground-based infrastructure and associated airborne equipment.

Table 1 summarises the key considerations and recommendation associated with each option.

#	Option	Key considerations
1	Voluntary Adoption	<p>Many airspace users and some ATS providers have voluntarily invested in EC devices because they are attracted by the benefits. A formal legal requirement to invest in EC devices, over and above individual incentive, is needed to ensure that the creation of a full known environment supported by electronic surveillance data is achieved for two reasons:</p> <ul style="list-style-type: none"> • Without a formal legal requirement on all users to invest in compliant EC devices, within a prescribed timeframe, it may be many years before a full known environment is achieved. If a full known-environment is to be achieved voluntarily, it will be difficult for stakeholders to pinpoint exactly when this will happen and develop their operations/airspace changes accordingly to realise the benefits. There is also a risk that even once a full known-environment is established, it may be lost again if there is no formal legal requirement for users to maintain the transmission of EC information to a minimum technical standard. • Voluntary investments in EC devices are driven by the specific benefits that they deliver to the users who buy them. These benefits vary by stakeholder group. Glider pilots are incentivised to invest in EC devices for different reasons to powered aircraft private pilots; the incentive for UAS operators is different again. Manufactures tailor their products to maximise the potential benefits for each individual stakeholder group, thereby strengthening the incentive to invest. This market driven model is likely to generate effective solutions to meet the demands of individual user groups, but the incentive to ensure interoperability across all devices and users is less obvious. The benefits of interoperability are derived from improvements in safety, efficiency, access and capacity that are distributed across all airspace users; these are systemic, network wide benefits, that do not fall to any one user group, so are unlikely to be in demand when individuals are investing voluntarily. <p>Recommendation: A regulatory intervention to compel users to transmit EC information to a minimum technical standard is needed to ensure that full known environment is achieved and maintained in a prescribed timeframe that stakeholders can plan investment towards.</p>
2	Rolling Programme of location specific mandates	<p>Location specific mandates that focus on blocks of airspace are intended to target areas where EC information has the greatest potential to deliver benefits. Over time, a programme of well-coordinated, location specific mandates might create the same widespread, network level changes delivered by a general equipage mandate.</p>

		<p>However, airspace users and ATS providers considered the proposal for location specific mandates to be overly complex. To be effective, each location specific mandate would need to include the requirements to transmit, receive and rebroadcast EC information. Stakeholders felt that the CAA should not set specific requirements on specific airspace users or ATS to receive and use/rebroadcast EC information because the market is sufficiently competitive and innovative to provide the right incentives for users to invest appropriately in these areas depending on their needs.</p> <p>Stakeholders were also concerned that the implementation of location specific mandates that focus on targeted blocks of airspace would require Airspace Change Proposals (ACPs) to implement. The timescales, costs and risks associated with completing the ACP process has the potential to deter stakeholders from participating in the generation of location specific mandates.</p> <p>The business case for stakeholders to participate in the implementation of location specific mandates is also undermined by a lack of certainty about the requirement for all users to adopt EC devices at a national level, an issue which would be addressed by a general equipage mandate.</p> <p>Recommendation: Providing there is a baseline of all users transmitting EC information to a minimum technical standard, then additional requirements in targeted blocks of airspace to receive and use/rebroadcast EC are not considered necessary at this stage.</p>
3	General Equipage Mandate	<p>A general EC equipage mandate applicable to all users is broad enough scope to enable the achievement of the three objectives of full EC adoption. A general mandate is simpler in nature because it only includes the requirement to transmit EC information to a common standard (operators should make commercial decisions about the solutions that receive and rebroadcast EC information). Manufactures of equipment have also indicated that without a general equipage mandate the business case for developing cost effective devices at the scale required by 2024 is not feasible.</p> <p>The options around the specific mechanism for mandating will require more detailed consideration following board agreement on the proposed approach. In general terms the options would be either an amendment to the Air Navigation Order (ANO), or by the CAA issuing various directives capturing specific groups of airframes.</p> <p>Recommendation: The CAA should formally establish the legal requirement for <u>all users</u> operating in U.K. airspace to transmit EC information to a minimum technical standard and confirm the timelines for this requirement to come into force. This requirement should be conveyed in a general equipage mandate that is published during Q4/2020 and effective from January 1st, 2024. The specific mechanism for enacting the mandate should be worked through in the following 6 months and publicized as soon as practicable. Stakeholders should</p>

		take commercial decisions regarding the additional devices they invest in to receive and use EC information based on their operational needs.
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Table 1: Options and recommendations for all users to transmit EC information

Risks

Three important risks associated with the general EC equipage mandate have been identified as needing to be managed through the implementation phase.

Spectrum supply risk:

Because the availability of the protected portion of radio frequency spectrum that is used by aviation stakeholders to transmit ADS-B (1090MHz) is limited, there is a risk that the general EC equipage mandate creates a surge in demand for spectrum that cannot be accommodated, leading to gaps in the ability to create a full known environment as the spectrum becomes saturated. Consideration was given to the use of non-aviation protected spectrum, but such unassigned frequency bands offer no assurance against degraded performance, interference (deliberate or otherwise) or the reallocation of the frequency to other non-aviation applications. Users of EC devices that rely on unassigned frequency bands subject themselves to the safety risks that the electronic surveillance data is unverified, and the devices are not built to known minimum standards. Incorporation of such emitted data becomes a safety risk in itself, particularly if then utilised by ground surveillance infrastructure.

In responses to the potential risks associated with the supply and demand of 1090MHz spectrum, the CAA engaged a technical specialist (QinetiQ) to model the impact of a general equipage mandate in one of the UK's spectrum congestion hotspots. The modelling took potential busy day scenarios provided by GA organisations and added them to existing data across all airspace users. The results showed that the risk of spectrum saturation has a low impact on the plans to implement a general equipage mandates, providing a majority of compliant devices are sufficiently low power (c.20W – which will become part of the proposed specification).

UAS integration risk:

The UAS integration risk is closely related to the spectrum supply risk. Given the potential high demand from the UAS sector and the finite amount of 24-bit identification addresses (required as a global standard) and spectrum availability, an alternative broadcast option is needed. This position is supported by a recent ICAO letter advising States not to apply 1090MHz spectrum to the UAS sector. When looking at international developments, it is clear that the only viable alternative with a mature technology is that used in the USA, where a second ADS-B frequency, 978MHz, has been approved by ICAO. This option has been assessed by the spectrum regulator (Ofcom) and a technical proposal on its potential use has been presented; Ofcom has agreed to our request, and we are confirming the extent of likely use for these purposes. The general equipage mandate proposed in this paper would include all UAS operators that are subject to the remote identification regulations and fall in the Specific and Certified category.

Technical standards risk

Articulating the technical standards that EC devices should comply with as part of the general equipage mandate is niche and highly complex, there is a risk the CAA does not retain the appropriate resources to define such standards in sufficient detail to enable implementation of the mandate. The CAA had intended to secure the specialist resources needed to create the technical standards for the general equipage mandate as part of a short-term consultancy engagement during Q2-2020, potentially via Section 16 funding with the DfT. The longer-term identification and recruitment for this skillset is subject to wider resource issues, compounded by COVID-19 pressures.

Limited support for a Mandate from the General Aviation community

Whilst the General Aviation community has shown a willingness to adopt EC, it is apparent that the appetite for a full mandate is less certain. Through further engagement with specific GA organisations, it has been identified that one of the main points for this is a lack of understanding as to how a mandate would help deliver better/more flexible airspace access. Additional work is underway within SARG to draw out the connections being made available under the Airspace Modernisation Programme to link improvements in situational awareness (for air traffic service providers) with ease of access for those wishing it. The CAA is engaging through specific working groups on Flight Information Services, Airspace Reclassification and Flexible Use of Airspace to ensure transparency and improved messaging.

Building on this, another issue raised is the perceived lack of benefit but increased cost (through equipment purchase) to the GA community, driven by pressures on capacity exerted by new users (unmanned aircraft) entering open (uncontrolled or class G) airspace. Were capacity the only issue, this might be a reasonable argument, but of course, as previously described, greater Electronic Conspicuity equipage aims to deliver 3 objectives, of which only one relates to the effects of greater numbers of users (mid-air Collisions); traffic integration, access and modernisation also being significant gains for the UK, and beneficial directly to General Aviation. Additionally, the CAA is working with the DfT to enable a refunding scheme utilising Government funds to mitigate the already reasonable cost of some Electronic Conspicuity equipment. The proposal from the CAA is considered to be 'the lowest regulatory impact possible', to mandate transmission only and allow users and the manufacturing industry to determine other aspects, such as receiver capability.

As the UK has, to date, failed to specify a standard for Electronic Conspicuity, a number of other 'niche' systems have developed to fill the void, designed to resolve issues specific to certain circumstances. One such example is a system known as FLARM, designed for use by gliders; this equipment uses protocols and algorithms designed to alert fellow glider pilots of their position. The system is excellent in the nature of those operations – large numbers of similarly capable airframes in very close proximity. It does not in its raw form read across to the wider objectives ADS-B will help achieve. However, FLARM manufacturers recognise this and have enabled their system to receive ADS-B signals already and are considering the value of full transmission if the need materialises; a UK mandate for ADS-B carriage will help in this area. In this way, FLARM can continue to operate and it can be interoperable with ADS-B. Pilotaware is another such example – in this case relying on transmission of signals including via ground stations to airborne users to share proximity information. Pilotaware could be made to operate on compatible frequencies and protocols as FLARM demonstrates, but ultimately, that is a decision for the manufacturer. Both

FLARM and Pilotaware operate outside aviation protected frequencies and ICAO standards and are therefore liable to reduced protection and performance, both essential if we are to use the new technology to seamlessly integrate UAS and other traffic.

Stakeholder engagement

Internal stakeholder engagement

All areas of the Safety and Airspace Regulation Group (SARG) are engaged in the EC Deployment Programme (ECDP) that is tasked and overseen with the development and implementation of an equipage mandate by the ECDP Control Board. The Control Board meets monthly and includes representatives from AAA, The UAS team, the General Aviation Unit, CAA Corporate Communications and the Office of the General Counsel. The CAA's Strategy and Policy team and Innovation Hub are also regularly engaged in the direction of the ECDP to ensure close alignment.

External stakeholder engagement

On 18 March 2019, the CAA published "Electronic Conspicuity – a call for evidence and future plans". This call for evidence closed on 25 May 2019. 327 responses were received from across the industry. As a follow-up to the call for evidence the CAA held a conference entitled 'Share the Air' in May 2019, where EC concepts were further developed, and industry were invited to present their own views on EC.

The CAA continue to engage with all potential user groups through regular meetings on the subject of EC, with an established Working Group (ECWG), chaired by the CAA and comprising stakeholders and technical experts meeting quarterly.

Finance and resource

The proposals to implement a general EC equipage mandate can be resourced from within the CAA's existing organisational structure and budget, and the costs for the specialist consultancy support required can be met from existing budgets and Section 16 DfT funding agreements currently under negotiation.

Central funding scheme for EC equipage

In a bid to further enhance safety within the GA community at the earliest opportunity, the DfT has provided funding of up to £2.5m to assist with the purchase of EC devices that can provide benefit to GA. For EC equipment purchases made during a limited period. The CAA will administer a fund that will reimburse against sanctioned/receipted and conforming solutions to encourage greater uptake of suitable devices contributing to the goals of full adoption, interoperability and a known environment. It is envisaged that such a reimbursement will be for 50% of the purchase cost (including VAT) to a maximum of £250 and will be attributed to a single registered pilot (single application per pilot).

Next steps and delivery

Delivering the mandate

There are three main ways for airspace users to deliver on the requirements of the proposed general equipage mandate:

- For EASA certified aircraft with a Mode S transponder that are not covered by the EASA mandate (i.e. less than 5.7 Tonnes and/or less than 250 knots): the requirements of the general equipage mandate can be achieved by connecting a GNSS (Global Navigation Satellite System) position source to their existing transponder. New rules issued by EASA in April 2019 authorise maintenance engineers to link a GNSS source with an ADS-B capable transponder, without the need for a design approval, thereby significantly reducing the cost of equipage.
- For aircraft operating on a 'Permit to Fly' issued by either the British Microlight Aircraft Association (BMAA) or the Light Aircraft Association (LAA): those organisations have published detailed procedures to connect a GNSS source to an ADS-B capable transponder. There will inevitably be some technical, cost and practical restrictions for some aircraft and Government funding has been made available to help cover the cost of investing in any standard of EC device as the UK continues to work towards the required level of interoperability required by a mandate.
- For non-transponder equipped aircraft that require a carry-on conspicuity device emitting to a minimum standard, (microlights, gliders, paragliders and hang gliders) the CAA will continue to work with manufactures and airspace users to develop and publish additional development standards during 2020.

Non-applicability and exemptions

The EC general equipage mandate is intended to apply to all users operating in U.K. airspace, however it is reasonable to assume that some criteria for non-applicability and/or exemptions for certain circumstances or modes of operation may apply. The conditions for non-applicability will be defined as part of the process for developing the technical standards that support the general equipage mandate. The applications for exemptions will be dealt with on a case by case basis.

Next steps

A general equipage mandate with a clear timeline of January 1st, 2024 will establish the full adoption of standard EC devices in UK airspace. It will also provide those developing and using EC devices with certainty about the technical standard to which they should align their investment decisions and plan their operations. Such certainty of technical standards can then be universally applied by all users. It will also help form part of the solution to enable the UAS sector to expand BVLOS operations outside segregated airspace based on a situational awareness capability that is interoperable with manned aircraft.

CAA SMEs will continue to work alongside DfT colleagues to ensure their desire for peer review of our strategy and technical evidence base is enabled; we will offer the draft strategy to the US and Australian Regulators for their view, and we will further test our

strategy with the National Air Traffic Management Advisory Committee – which brings together the representative organisations with interest in this area.

The CAA Board is requested to support the CAA's plans to progress with the implementation of the general EC equipage mandate, including:

- Production of detailed technical and spectrum standards that the general equipage mandate will require, and the approach to integrating existing EC devices that many users have already invested in.
- Definition of a detailed approach to checking users' compliance with the terms of the mandate, conducting enforcement actions in the case of non-compliance and managing exemptions as appropriate.
- Finalising a full Regulatory Impact Assessment (RIA) in support of the general equipage mandate.

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PRE-SUBMISSION IMPACT CHECKLIST

CAA Risks – discussed with your team’s risk champion and against the existing risk register? Yes

[insert: Yes/ No. If no, explain why]

Legal implications – has OGC been included in the recommendation and do they support it? Yes

[insert: Yes/ No. If no explain why]

Impact Assessment (IA) - Does this report create a change to legislation? If so – has the required Impact Assessment been completed and included in the paper? Yes – A revision to the ANO likely and RIA is in production.

[insert: Yes/ No. If no explain why]

Business Impact Target (BIT) - Does the proposal fall under the scope of the BIT? tbc

[insert: Yes/ No. If no explain why]

Growth Duty - How have you considered the CAA’s Growth Duty responsibilities? U/K

[insert: Yes/ No. If no explain why]

Consumer Panel - Has the Consumer Panel been consulted? If yes, what was their view? If no, why not? tbc

[insert: Yes/ No. If no explain why]

Title: IA No: RPC Reference No: Lead department or agency: Other departments or agencies:	Impact Assessment (IA)			
	Date: 01/06/20			
	Stage: Deployment			
	Source of intervention: Domestic			
	Type of measure: Secondary Legislation			
Contact for enquiries:				

Summary: Intervention and Options	RPC Opinion: RPC Opinion Status
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Cost of Preferred (or more likely) Option (in 2016 prices)			
Total Net Present Social Value	Business Net Present Value	Net cost to business per year	Business Impact Target Status
£m	£m	£m	Qualifying provision

What is the problem under consideration? Why is government intervention necessary? (7 lines max)

When flying under VFR in class G airspace, there is no formal requirement to carry or use an electronic conspicuity (EC) device, with users relying on visual scanning or voluntarily investing in some form of transponder device.

Mandating a standard EC transmission on a protected portion of aviation spectrum, e.g. ADS-B, will increase the quality of information available and thus increase situational awareness, mitigate against the risk of mid-air collisions (MAC) in Class G and infringements into controlled airspace, and enable the safe and efficient integration of UAS operations with conventional air traffic in line with the CAA's Airspace Modernisation Strategy. Government intervention is required to ensure there is complete uptake of a standardised EC technology by airspace users to ensure interoperability of airborne and ground based systems.

What are the policy objectives and the intended effects?

The objective is to create a fully known airspace environment supported by electronic surveillance data in support of the "see, be seen and avoid" concept for all airspace users. This will:

1. increase safety standards in uncontrolled airspace by reducing the risk of mid air collisions, and mitigating against airspace infringements into controlled airspace;
2. increase efficiency of airspace use by seeking to offer users access to the airspace they require;
3. enable greater UAS integration;
4. provide certainty to airspace users and manufacturers regarding future surveillance investment requirements; and,
5. enable the provision of ancillary benefits to users, such as weather and aerodrome status.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base) (10 lines max)

Do nothing (i.e. allow voluntary adoption): allows airspace users to invest in EC devices voluntarily. But, without a formal legal requirement or prescribed timeframe, it will take time to achieve a full known environment. This options risks the adoption of 'niche' devices that are not interoperable across all user groups.

Rolling programme of location-specific mandates: introduce a mandate which focuses on areas where EC information delivers the greatest benefits, and leave it to the market to develop the right solution. This is considered to be overly complex and would potentially add layers of unnecessary effort and confusion to the ongoing airspace change programme.

Mandate General Equippage: Mandate the requirement only to transmit EC information to a common standard. Doing so is deemed the softest regulatory intervention and will allow the market to deliver cost effective devices and will ensure these are available at the required scale by 2024.

Will the policy be reviewed? It will not be reviewed. If applicable, set review date: Month/Year

Does implementation go beyond minimum EU requirements?	Yes			
Is this measure likely to impact on international trade and investment?	No			
Are any of these organisations in scope?	Micro Yes/No	Small Yes/No	Medium Yes/No	Large Yes/No
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)	Traded:		Non-traded:	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible SELECT SIGNATORY: _____ Date: _____

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Summary: Analysis & Evidence

Policy Option 1: Voluntary adoption

Description:

FULL ECONOMIC ASSESSMENT

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate:
COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Cost (Present Value)
Low	Optional		Optional		Optional
High	Optional		Optional		Optional
Best Estimate					
Description and scale of key monetised costs by 'main affected groups' (5 lines)					
<p>Costs will be dependent on the rate and scale of uptake by GA and BVLOS drone users and the impact of the uptake on market prices. With no formal mandate to adopt EC by a certain timeframe, the industry is less likely to benefit from economies of scale, and therefore the device cost may be higher than for other options. The cost of an EC device is expected to be in the region of £500, with costs reaching up to £2000 for equipment to a full transponder depending on the level of technical specification required by for GA users, and the ability of GA users to adapt any existing kit. Drone operators can expect to pay in the region of £1800 per device while aerodromes may chose to invest in voluntary ground based kit costing in the region of £1500.</p>					
Other key non-monetised costs by 'main affected groups' (5 lines)					
BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Benefit (Present Value)
Low	Optional		Optional		Optional
High	Optional		Optional		Optional
Best Estimate					
Description and scale of key monetised benefits by 'main affected groups' (5 lines)					
n/a					
Other key non-monetised benefits by 'main affected groups'					
<p>The main benefits from a voluntary approach to EC adoption will be significantly lower than other options, as there is less opportunity to benefit from network effects i.e. the benefits increase the greater the level of uptake of interoperable systems by airspace users. Benefits include an increase in flight safety, avoidance of MAC, enhanced opportunities for a flexible use of airspace on an "as required" basis, increased airspace access for GA and drone users, increased ground-based situational awareness, and increased cockpit situational awareness. Commercial aviation will benefit from a reduction in disruption caused by airspace infringements. Finally, aerodromes which invest in systems will benefit from a reduction in incursions and an improvement in safety where the aerodrome has no prior surveillance capacity. CAA and aerodromes may see a reduction in costs of reporting and investigating airspace infringements.</p>					
Key assumptions/sensitivities/risks					Discount rate (%)
The scale of costs and benefits will depend on the speed of uptake, and the impact that this may have on the market value of the EC devices available to users. Voluntary uptake is likely to deliver the lowest level of benefits as operators develop their own business cases for uptake					

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs:	Benefits:	Net:	

Summary: Analysis & Evidence

Policy Option 2: Rolling programme

Description:

FULL ECONOMIC ASSESSMENT

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate:
COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Cost (Present Value)
Low	Optional		Optional		Optional
High	Optional		Optional		Optional
Best Estimate					
Description and scale of key monetised costs by 'main affected groups' (5 lines) As per option one, the costs of the EC device will be reliant on the speed of uptake by users and the ability of the market to develop a low cost conspicuity device. As per option 1, costs for GA are expected to fall in the region of £500 - £2000; costs for BVLOS Drone operators are in the region of £1800 and, finally, costs for aeordromes which opt to invest in voluntary ground based systems will be c £1500.					
Other key non-monetised costs by 'main affected groups' (5 lines) The option to introduce location specific mandates was considered to be the most complex and could require airspace change proposals to implement.					
BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Benefit (Present Value)
Low	Optional		Optional		Optional
High	Optional		Optional		Optional
Best Estimate					
Description and scale of key monetised benefits by 'main affected groups' (5 lines)					
Other key non-monetised benefits by 'main affected groups' As per option 1, the benefits to be derived from this option will be lower than for a full mandated uptake of EC devices. However, as this option will likely target known safety hotspot areas first where EC has the greatest potential to deliver real changes, the speed and scale of benefits to be derived will be higher than for option 1 but lower than for option 3.					
Key assumptions/sensitivities/risks					Discount rate (%)
The scale of costs and benefits will be dependent on the way in which the programme of roll out is delivered, as well as the extent to which the market develops devices that are interoperable. This methodology would also perversely increase the volume of 'classified' airspace, contrary to the wishes of the DfT/Sec of State.					

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs:	Benefits:	Net:	

Summary: Analysis & Evidence

Policy Option 3: Mandated uptake

Description:

FULL ECONOMIC ASSESSMENT

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate:
COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Cost (Present Value)
Low	Optional		Optional		Optional
High	Optional		Optional		Optional
Best Estimate					
Description and scale of key monetised costs by 'main affected groups' (5 lines) Total costs are to be quantified for the final stage impact assessment once full figures for the total number of users, and cost of devices have been clarified. Initial estimates indicate a one-off cost depending on preferred means equipage of around £500 - £2000 per kit for GA users not already equipped with the required device. Initial estimates suggest that there are 10,000 GA users already equipped, with c17,000 still to be equipped. The costs are higher at c.£1800 per kit for BVLOS Drone operators, with the potential to impact 10,000 to 20,000 operators. Finally, the potential cost to smaller aerodromes to adopt voluntary transponder kit is estimated to be in the region of £1500 per aerodrome based on previous CAA trial data					
Other key non-monetised costs by 'main affected groups' (5 lines)					
BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Benefit (Present Value)
Low	Optional		Optional		Optional
High	Optional		Optional		Optional
Best Estimate					
Description and scale of key monetised benefits by 'main affected groups' (5 lines)					
Other key non-monetised benefits by 'main affected groups' The main benefits from mandating general equipage of EC for all airspace users will be an increase in flight safety, avoidance of MAC, enhanced opportunities for a flexible use of airspace on an "as required" basis, increased airspace access for GA and drone users, increased ground-based situational awareness, and increased cockpit situational awareness. Commercial aviation will benefit from a reduction in disruption caused by airspace infringements. Finally, aerodromes will benefit from a reduction in ATZ incursions and an improvement in safety (where the aerodrome has no existing surveillance capacity). CAA and airports will see a reduction in costs of reporting and investigating airspace infringement. Widespread airborne equipage will encourage development and availability of 'additional' services provided via ground infrastructure; these services include weather data and aerodrome servicibility status.					
Key assumptions/sensitivities/risks					Discount rate (%)
The cost figures are based on our forecast of the potential number of GA and BVLOS drone operators to be impacted by the mandate when it comes into force in 2024, as well as the technical specification of the kit chosen by users.					

BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs:	Benefits:	Net:	

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Evidence Base (for summary sheets)

- Policy objective;
- Description of options considered (including status-quo);
- Monetised and non-monetised costs and benefits of each option (including administrative burden);
- Rationale and evidence that justify the level of analysis used in the IA (proportionality approach);
- Risks and assumptions;
- Direct costs and benefits to business calculations (following BIT methodology);
- Wider impacts (consider the impacts of your proposals). Document any relevant impact here and by attaching any relevant specific impact analysis (e.g. impact on small and micro businesses, equalities, etc.) in the annexes to this template)
- A brief qualitative summary of the potential trade implications of measure. This should include an assessment of whether the measure is likely to impact on trade or investment. For further assistance and guidance please refer to DIT.
- Summary and preferred option with description of implementation plan.

----- TO BE COMPLETED:

This section needs to incorporate text from the CAA's AMS, evidence from the Call for Evidence and core themes of feedback received to support the problem statement and provide background for the options considered: eg

UK airspace is some of the most complex in the world, yet its design dates back to the 1950s and 1960s. Although route design has been added to and adapted in response to growing traffic levels, some routes have been little changed for decades. Accommodating the increased growth in traffic has meant adding significant complexity to the UK's airspace system. Alongside the growth in commercial traffic, the UK is seeing a continued growth in airspace demand from General Aviation users, as well as an increase in the use of unmanned aviation systems such as drones which bring with them different airspace demands.

The safe integration of such users is one of the key aspects to enable the delivery of the CAA's Airspace Modernisation Strategy (AMS), which was released in December 2018. The AMS recognised that the widespread adoption of electronic conspicuity solutions that make all aircraft more visible is needed to maintain high safety standards in uncontrolled airspace, especially around smaller aerodromes that have no surveillance capability themselves and in areas with a high density of airspace users that may be harder to see with the naked eye, such as light aircraft, gliders, hang gliders and drones.

Incorporating an ever growing mix of traffic into the UK's already complex airspace, requires advanced technological tools and air traffic solutions. In recognition of this, in March 2019 the CAA issued a Call for Evidence on proposals to mandate all electronic conspicuity stating that the widespread adoption of Electronic conspicuity (EC), where everything flying sends out an electronic signal identifying it, will be key in achieving safe and sustainable airspace for the UK in the future.

The feedback from the CAA's Call for Evidence found that there was a broad level of support within the aviation community to engage with EC. However this was qualified by the desire for any solution to be practical and to deliver value to users. The CAA stated its intention to bring forward proposals to require EC where its use reduces the likelihood of mid-air collisions and where such mid air collisions are a serious risk to those people either engaged in flying or on the ground.

This section should then set out further information here about who is captured by the CAA's proposals at a high level, e.g.

- Preferred option is to mandate the equipage of ADS-B transponders (out only) by 1st January 2024.

- Aircraft that weigh more than 5700kg are covered by EASA mandate (coming out June 2020). This proposal would capture everything else that flies below that weight. Including GA (light aircraft, gliders, balloons etc) but also Unmanned Aircraft Systems (UAS). There will be some exceptions (model aircraft, very light drones).
- Reflect that some GA users have already voluntarily invested in some form of transponder (although some are non-ADSB) but that these might no longer be compliant and may need replacing.

Options to be described with a brief overview of the pros and cons of each in terms of ability to meet the policy objectives.

Any links to costings, and any benefits analysis undertaken to support mandate

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