

ADS-B in Europe



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Is ADS-B important to GA?



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Doesn't matter...

- We are going to be forced to equip rather sooner than later.
- ATC wants it because it makes their jobs easier and safer.
- Already mandatory in many countries, including Europe for certain categories of planes.

What standards in the rest of the world?



Australia. 1090ES required for all IFR operations. Foreign-registered aircraft equipped with transponders are exempted below FL290 until June 6, 2020.

Canada. Currently no mandate, but operators who voluntarily equip with 1090ES (particularly in the Hudson Bay and nearby oceanic airspace) can receive a higher level of service. Nav Canada is part of a joint air traffic surveillance venture, Aireon, installing ADS-B equipment on low-earth-orbit satellites. Nav Canada will be the launch customer when the service becomes available in 2018, and initially intends to incorporate 1090ES ADS-B into North Atlantic airspace.

Europe. 1090ES required for IFR aircraft with a MTOW exceeding 12,566 pounds or maximum cruise airspeed faster than 250 KTAS. Mandatory for new-production aircraft, and must be retrofitted into all aircraft by June 7, 2020. (Dates have slipped from original timetable.)

Hong Kong. 1090ES required in all airspace, FL290 and above.

Indonesia. 1090ES required, FL290 and above, beginning January 1, 2018.

Mexico. 1090ES required beginning January 1, 2020, in Class A, B, C, E above 10,000 feet msl, and other specified airspace. Requirement takes effect January 1, 2018, in Class E airspace over the Gulf of Mexico, at and above 3,000 feet msl within 12 nm of the Mexican coast.

Singapore. 1090ES required on specified airways.

Sri Lanka. 1090ES required within the Colombo Terminal Control Area (TMA), FL290 and above.

Taiwan. 1090ES required in all airspace, FL290 and above.

Vietnam. 1090ES required on specified airways.

China. Starting to deploy ADS-B, using UAT.

And in the largest GA market worldwide



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USA:

By Jan, 1, 2020 ADS-B out is mandatory for all aircraft. 1090ES is the preferred “out” mode. UAT (978 MHz) is also available.

- Avionics shops are solidly booked for ADS-B installations
- Cost of installation has dropped dramatically.
 - GTX330 Mode S upgrade to 1090 ES: 1300 USD
 - Funke TRT800H OLED ES: < 2500 USD
- No aircraft will access controlled airspace or TMA's without being ADS-B compliant

USA: largest aviation market worldwide



- Pilots have a real incentive to equip with ADS-B out:
 - Not expensive
 - All the fleet is transitioning
 - ATC treats GA with direct routing
 - In exchange of 1090 ES, pilot gets:
 - Traffic information (TIS-B)
 - Weather information (through UAT, 978 MHz link)

USA: largest aviation market worldwide



- What does a ADS-B installation typically cost?
 - Upgrade of transponder (Garmin GTX330): 1300 USD
 - Install of upgrade: 350 USD
- Aircraft is compliant with ADS-B OUT mandate for around 1650 USD when they choose 1090 ES.
- Can be cheaper if they choose UAT (978 MHz) for ADS-B OUT (only below 18 000 ft), then,
 - It receives TIS-B information from the ground
 - It receives ADS-B information from other aircraft around

1090 ES v/s UAT 978 MHz



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- In the USA, the FAA encourages planes flying under 18000 ft to use UAT as their ADS-B frequency
 - Less planes broadcasting on the 1090 MHz frequency
 - 1090 MHz doesn't allow for weather data reception in the cockpit.

What benefits?



ADS-B provides many benefits to both pilots and air traffic control that improve both the safety and efficiency of flight traffic

- When using an *ADS-B In* system, a pilot is able to view traffic information about surrounding aircraft if those aircraft are equipped with ADS-B out. This information includes altitude, heading, speed, and distance to aircraft.
- In addition to receiving position reports from ADS-B out participants, TIS-B [USA-only] can provide position reports on non ADS-B out-equipped aircraft if suitable ground equipment and ground radar exist. ADS-R re-transmits ADS-B position reports between UAT and 1090 MHz frequency bands.

What benefits?



- Weather – Aircraft equipped with universal access transceiver (UAT) *ADS-B In* technology will be able to receive weather reports, and weather radar through flight information service broadcast (FIS-B). [USA-only]
- Flight information – Flight information service-broadcast (FIS-B) also transmits readable flight information such as temporary flight restrictions (TFRs) and NOTAMs to aircraft equipped with UAT. [USA-only]
- Expense - ADS-B ground stations are significantly cheaper to install and operate compared to primary and secondary radar systems used by ATC for aircraft separation and control.
- Unlike some alternative in-flight weather services currently being offered commercially, there will be no subscription fees to use ADS-B services or its various benefits in the US. The aircraft owner will pay for the equipment and installation, while the Federal Aviation Administration (FAA) will pay for administering and broadcasting all the services related to the technology.

What benefits?



- In short, in the USA:
 - All planes will broadcast ADS-B signals (ADS-B OUT) to ATC and other planes
 - A plane equipped with ADS-B IN receives:
 - TIS-B: traffic information coming from ALL traffics detected by ground radar (balloons, gliders, ultra-light etc.) + ADS-B equipped planes
 - Weather and up to date relevant information (Prohibited zones, NOTAMS)

The Game changer



- UAT receivers are cheap, dirt cheap:



- This is the Scout UAT ADS-B receiver
 - Receives Weather, Traffic, TFR's, Displays on iPad, the cheapest MFD on the planet.
 - Costs 200 USD

Europe



ADS-B is coming for us

- Same story as:
 - FM immunity
 - Mode S
 - 8.33 KHz
- No benefits for us are planned by the authorities...
 - “Pay for new equipment, ATC needs it, so you don’t have a choice”

Europe



- Our authorities are telling us that UAT is impossible to implement in Europe.
 - **Cost of broadcast from ground radar stations.**
 - It is a software upgrade to the radar station. Cost is lesser than the maintenance of 1 ILS in a year.
 - **Frequency 978 MHz, is not available**
 - 978 MHz is reserved worldwide for aviation use... Aren't we aviation users?

The path forward



We should lobby strongly to obtain:

- Voluntary ADS-B equipment for GA, using 1090 ES as our preferred ADS-B OUT frequency.
- Upgrade of radar ground stations to broadcast all traffic detected (Mode A, Mode C, primary targets and ADS-B participant planes)
- Use UAT, as it is already a standard recognized by ICAO and many countries, using a frequency reserved for aviation use (actually the frequencies between 960 MHz and 1,164 GHz are reserved for aviation)

UAT Frequency 978 MHz



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- In a band reserved for aviation
- European frequency attribution list states that the band between 960 and 1.164 GHz is aviation and Military.
- Assigned to the Joint Tactical Information Distribution System

Joint Tactical Information Distribution System



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The **Joint Tactical Information Distribution System (JTIDS)** is/was an L band Distributed Time Division Multiple Access (DTDMA) network radio system used by the United States armed forces and their allies to support data communications needs, principally in the air and missile defense community. It produces a spread spectrum signal using Frequency-shift keying (FSK) and Phase-shift keying (PSK) to spread the radiated power over a wider spectrum (range of frequencies) than normal radio transmissions. This reduces susceptibility to noise, jamming, and interception. In Time Division Multiple Access (TDMA) (supposedly like cell phone systems), each time interval (e.g. 1 second) is divided into time slots (e.g. 1024 per second). Together, all the time slots in the interval are called a "frame". Each slot is "bursted" (transmitted) at a different frequency (FSK). Within each slot, the phase angle of the transmission burst can be varied to provide PSK. Each type of data to be transmitted is assigned a slot or block of slots (channel). In TDMA, the slot frequencies remain fixed from second to second (frame to frame). In DTDMA, the slot frequencies and/or slot assignments for each channel do not remain fixed from frame to frame but are varied in a pseudo-random manner. The slot assignments, frequencies, and information may all be encrypted to provide computer-to-computer connectivity in support of every type of military platform from Air Force fighters to Navy submarines.

Joint Tactical Information Distribution System



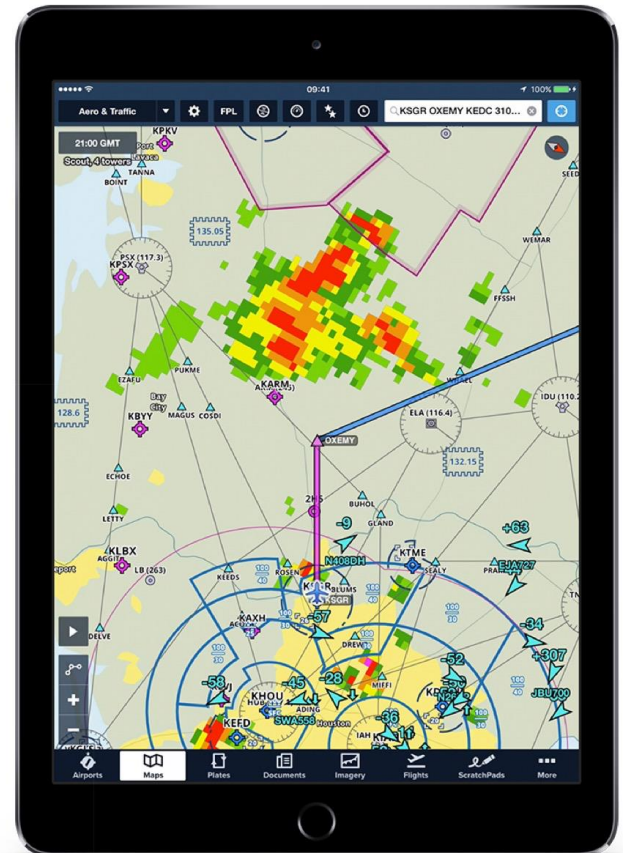
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- When consulted, military experts explained that it is easy to “eliminate” the frequencies needed for UAT, as it was already done in the USA, because of the use of UAT!
- The USA, responsible for the development of the system and distribution to NATO allies, has stopped using the UAT frequency for JTIDS. Therefore, NATO should not use it anymore...

The path forward



- This would allow GA pilots to use the latest technology available to us (Glass cockpits, iPad, cost effective screens) to display information that is critical to us, while benefitting from the cost effectiveness of hardware solutions already available on the largest aviation market.



21:00 GMT

Scout, 3 towers



Navigation sidebar with icons for:

- Play button
- Home button
- City selection (B+ City)
- Map selection (KBY)