European Union Aviation Safety Agency

Automatic Dependent Surveillance — Light (ADS-L)

Introduction to ADS-L

What is ADS-L, and how does it differ from ADS-B?

Answer

ADS-L stands for "Automatic Dependent Surveillance - Light". It is a protocol designed to enable low-cost, low-power devices to transmit position and other data, enhancing situational awareness and safety in aviation. ADS-L is distinct from ADS-B, but compatible in terms of parameter definitions. (e.g. B for broadcast has been deliberately omitted in anticipation of the possibility of network communications). The "light" in ADS-L refers to the use of low-power, low-cost devices, making it an attractive solution for general aviation, and other aircraft not equipped with certified ADS-B installations. ADS-L transmission is not intended to provide any credit during IFR operations except enhancing pilots' situational awareness.

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https://www.easa.europa.eu/sl/faq/141884

Why is ADS-L needed and what benefit does it bring?

Answer

Many aircraft, especially in general aviation, are not equipped with certified ADS-B installations. ADS-L provides a unified, cost-effective and easy-to-implement solution for these aircraft to enhance their situational awareness and safety. By using ADS-L, aircraft can be visible to other ADS-L equipped aircraft, reducing the risk of collisions and improving overall safety.

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What are the transmission links supported by ADS-L?

Answer

ADS-L is a protocol that can be transmitted over different links. A standard for ADS-L messages over the SRD860 frequency band is already available. Future specifications will follow to enable ADS-L to be transmitted over mobile networks such as 4G and 5G.

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Regulatory Framework and Recognition

Is ADS-L technology recognized or mandated by EASA or other aviation authorities?

Answer

ADS-L is recognized by EASA as a means to enhance situational awareness and safety in aviation, particularly in U-Space (SERA.6005(c)). While there are no current mandates requiring the use of ADS-L (other than U-space airspace), EASA and the ADS-L coalition promote its adoption as an essential means of improving aviation safety. The recognition of ADS-L by industry and EASA is a significant step towards its widespread adoption and integration into the European aviation landscape.

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Are there any upcoming deadlines or regulatory changes related to ADS-L adoption in Europe?

Answer

There are no foreseen mandates requiring the use of ADS-L. However, electronic conspicuity mandate in SERA.6005(c) already recognises it as one of a few means to be conspicuous in U-Space (e.g. as an alternative to ADS-B out certified solutions).

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Technical Aspects and Interoperability

How does ADS-L transmission power compare to traditional ADS-B, and what does that mean for range?

Answer

ADS-L transmission power is limited to 14 dBm (25 mW ERP) in the M-band and 27 dBm (500 mW) in the O-band, as per the SRD860 spectrum regulations. While the transmission power is lower than traditional ADS-B, ADS-L can still achieve air-to-air ranges of over 10 km, making it suitable for its intended use. The range of ADS-L is highly dependent on installation, and following best practices can help achieve optimal performance.

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Will ADS-L be interoperable with existing ADS-B and Mode S transponders?

Answer

Certified ADS-B and Mode S transponders will not be upgradeable in the near future to integrate ADS-L. However, new and simple devices receiving both ADS-B and ADS-L will appear on the market, facilitating data exchange and enhancing situational awareness. The interoperability of ADS-L with existing systems will enable a more comprehensive and accurate picture of the traffic in the airspace, improving safety and reducing the risk of collisions.

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Does ADS-L equipment transmit flight data such as position and altitude, similar to ADS-B Out?

Answer

Yes, ADS-L transmits parameters identical to those contained in ADS-B Out messages, including aircraft identification, position, GNSS altitude and more, but it does not require the transmission of e.g. barometric altitude, making the device more affordable. It also supports additional payload types, enabling future use cases such as traffic rebroadcasting, weather, etc.

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What frequencies does ADS-L use?

Answer

Similarly to many systems already in use, ADS-L can be used on the M-band and O-band of the SRD860 spectrum. The ADS-L standard specifies the use of two frequencies in the M-band (868.2 MHz, 868.4 MHz) and one frequency in the O-band (869.525 MHz). In the future, ADS-L may be used over other links (e.g. mobile networks).

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Does ADS-L require a GNSS source or other external sensors to provide accurate positioning?

Answer

Devices transmitting ADS-L rely only on a GNSS position source, configuration settings, and

pilot inputs to elaborate the ADS-L messages.

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Implementation and Integration

What hardware or software updates are required to equip my GA aircraft with ADS-L?

Answer

It is expected that a wide variety of devices, including portable and installed systems, as well as mobile applications, will support ADS-L. Software or firmware updates will also be available for many existing conspicuity devices to add ADS-L capabilities. You may contact your vendor to determine the best solution for your aircraft and needs.

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Can ADS-L be integrated with popular cockpit traffic awareness apps or portable receivers (e.g., moving map solutions)?

Answer

Yes, ADS-L is designed to be easily integrated by existing systems once upgraded. Support for traffic display on moving maps and other situational awareness applications is expected, enhancing the overall safety and efficiency of flight operations. The integration of ADS-L with existing systems will enable pilots to have a more comprehensive and accurate picture of the airspace, improving situational awareness and reducing the risk of collisions.

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If my aircraft already has FLARM or a Mode S transponder, is ADS-L still beneficial?

Answer

Yes, ADS-L is beneficial even if your aircraft is already equipped with FLARM or a Mode S transponder. Alongside existing protocols such as FLARM, ADS-L provides a unified language that can be received by a maximum number of systems, enhancing situational awareness and safety. The use of ADS-L can also facilitate the integration of other systems and technologies.

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Are there any cost advantages to ADS-L compared to installing a full ADS-B solution?

Answer

ADS-L and ADS-B do not fulfil the same uses and have different intended uses. The use of low-power, low-cost, non-certified devices and the potential for software or firmware updates to existing systems make ADS-L an attractive solution for general aviation and other aircraft, possibly alongside other existing protocols or certified surveillance solutions.

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How can I ensure my aircraft’s ADS-L system meets EASA standards and any local CAA requirements?

Answer

ADS-L increases situational awareness by enabling more aircraft to see and be seen by other ADS-L aircraft. This is particularly useful in busy airspace.

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Safety and Situational Awareness

How can ADS-L help me enhance my situational awareness in busy airspace?

Answer

ADS-L increases situational awareness by enabling more aircraft to see and be seen by other ADS-L aircraft. This is particularly useful in busy airspace.

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Will I need to coordinate with air traffic control to activate or deactivate ADS-L functionality?

Answer

No, ADS-L is currently not recognized by ATM services in EASA countries, but it could be used without restriction in any airspace (controlled or uncontrolled) for enhancing pilot's situational awareness. There is ongoing research in ATM (ref. European Plan for Aviation Safety task RES.0032) which will identify cases where ADS-L could be beneficial for use in ATM. FIS, SAR and access to Transponder Mandatory or Radio Mandatory Zones are being considered. Results are expected by mid-2026.

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How does ADS-L improve “electronic conspicuity” for drones or unmanned aircraft operating nearby?

Answer

Starting with its version 2, ADS-L will support the uplink of RemoteID messages, enabling ADS-L receivers to process drone information rebroadcasted by ground stations. This enhances the safety and situational awareness of GA pilots of drone operations and vice versa.

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Will ADS-L be visible to other airspace users, such as commercial airliners or military aircraft?

Answer

It is not expected that certified avionics for commercial aircraft will support ADS-L in the near future. However, EASA is working on promoting the use of ADS-L also for ATM use cases such as improving air traffic controllers' situational awareness in complex airspaces. The visibility of ADS-L to controllers and other airspace users will enhance safety and reduce the risk of collisions.

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