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Agenda Item 4: Accountability Report of the ICAO NACC No Country Left Behind (NCLB) Strategy
4.2 Regional Air Navigation/Safety Developments and Achievements
4.2.4 Report of the NAM/CAR Air Navigation Implementation Working Group (NAM/CAR ANI/WG)

AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST (ADS-B) OUT; ENSURING PREPAREDENSS FOR THE 2020 EQUIPAGE MANDATE

(Presented by United States)

EXECUTIVE SUMMARY	
In 2010, the U.S. Federal Aviation Administration published a regulatory requirement for all aircraft operating within certain airspace to be equipped with Automatic Dependent Surveillance – Broadcast (ADS-B) Out technology by January 1, 2020, per Title 14 of the U.S. Code of Federal Regulations (CFR) part 91.225 and 91.227. This requirement will affect both U.S. and foreign operations. To ensure preparedness throughout the aviation community, and prevent any operational disruptions, the FAA is promoting awareness to the international community so that foreign aircraft intending to operate within the affected airspace will be sufficiently equipped with ADS-B Out technology by the time the requirements come into effect.	
Strategic Objectives:	• Safety

1. INTRODUCTION

1.1 Automatic Dependent Surveillance – Broadcast (ADS-B) is one of the most important, underlying technologies in the U.S. Federal Aviation Administration's (FAA) plan to transform air traffic control from the current radar-based system to NextGen, a satellite-based system. ADS-B is bringing the precision and reliability of satellite-based surveillance to the United States.

1.2 In 2010, the U.S. Federal Aviation Administration published a regulatory requirement for all aircraft operating within certain airspace to be equipped with ADS-B Out technology by January 21, 2020, per Title 14 of the U.S. Code of Federal Regulations (CFR) part 91.225 and 91.227.

1.3 This requirement will affect both U.S. and foreign operations. To ensure preparedness throughout the aviation community, and prevent any operational disruptions, the FAA is promoting awareness so that aircraft intending to operate within the affected airspace will be sufficiently equipped with ADS-B Out technology by the time part 91.227 comes into effect.

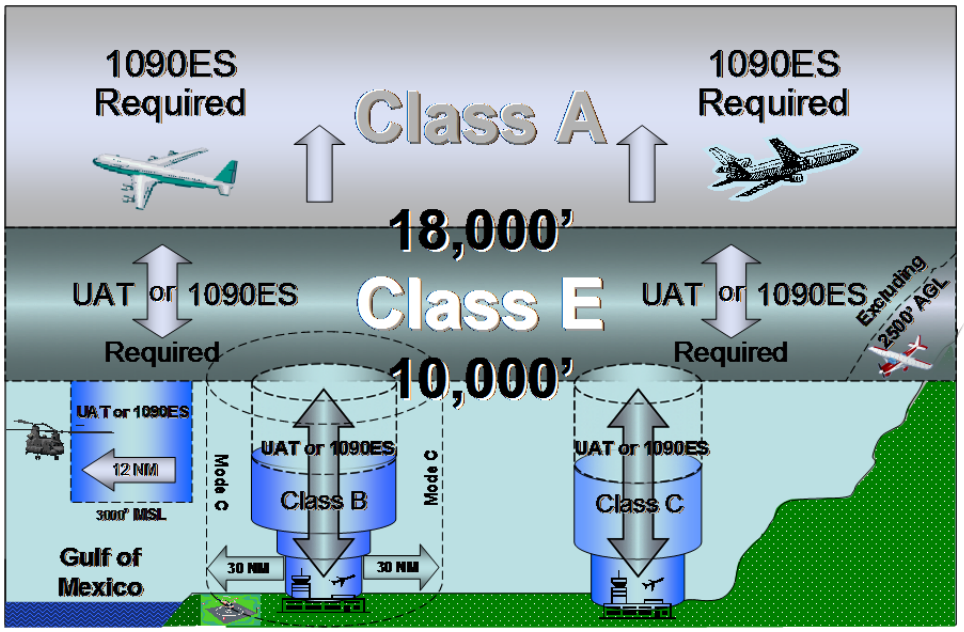
2. DISCUSSION

2.1 ADS-B uses Global Positioning System (GPS) technology to determine specific aircraft information, which is then broadcasted to air traffic controllers and other equipped aircraft via a nationwide network of ground stations. Its numerous performance benefits include the ability to; provide more frequent position update-rates than radar, deliver more precise location and velocity information for the aircraft, and offer critical in-cockpit traffic and weather information.

2.2 The improved accuracy, integrity and reliability of satellite signals over radar means controllers will be able to safely reduce the mandatory separation between aircraft. This will increase capacity in the national airspace system. ADS-B also provides greater surveillance coverage, since ADS-B ground stations are much easier to place than radars. Remote areas without radar coverage, such as the Gulf of Mexico and parts of Alaska, are now covered by ADS-B.

2.3 The FAA published Federal Regulation 14 CFR 91.225 and 14 CFR 91.227 in May 2010 for ADS-B Out equipage after January 1, 2020. This rule mandates performance requirements for ADS-B avionics that will be required to fly in certain airspace. The rule does not preclude other navigation source method, nor does it mandate ADS-B In equipage. The ADS-B rule does not apply to any aircraft that was not originally certificated with an electrical system or that has not subsequently been certified with such a system installed, including balloons and gliders.

2.4 ADS-B in the U.S. NAS operates on two frequencies (links): 1090 MHz and 978 MHz. Equipment choices include either a Mode S transponder-based 1090 Extended Squitter (ES), or, a Universal Access Transceiver (UAT) operating on 978 MHz. Aircraft operating above FL180 (18,000 feet), must be equipped with a Mode S-transponder-based ADS-B transmitter. Aircraft operating below 18,000 feet and within U.S. airspace must be equipped with either a Mode S transponder, or UAT equipment. The below graphic illustrates these requirements.



2.5 The FAA has completed the deployment of ADS-B ground radios and has called on aviation users to equip their aircraft in advance of the Jan 1, 2020 mandate.

2.6 The FAA has been working collaboratively with both the airline industry and the general aviation community in the United States to ensure awareness of this requirement. On October 28, 2014, FAA senior officials met with more than 80 industry representatives of pilots and operators, manufacturers and suppliers at an "ADS-B Call to Action" meeting to identify and address barriers to equipping with ADS-B Out by January 1, 2020, as required by FAA regulations. The participants agreed that the aviation community must work together to meet the mandate's schedule, and the industry participants identified a number of potential barriers to meeting the mandate and developed corresponding action plans in working sessions.

2.7 Five working groups were formed to address suggestions from the Call to Action:

- Air Carrier Equipage: This working group coordinates and monitor the equipage of ADS-B Out in the Part 121 and 135 community, tackling issues relevant to availability of equipment and its installation.
- General Aviation Equipage: This working group coordinates and monitors the equipage of ADS-B Out in the General Aviation community, tackling issues relevant to availability of equipment and its installation.
- GPS Receiver and Performance-Based Rule Implications: This ad hoc group defined the opportunities for sharing the risks of using unaugmented GPS equipment that does not meet the performance requirements of the rule for a limited time sufficient for certain operators to equip with SBAS or multi-constellation receivers.
- Education and Benefits: This working group coordinates education and outreach to the community concerning ADS-B Out requirements and benefits. The group also identifies additional benefits that could be implemented for equipped aircraft.
- Installation and Approvals: This working group addresses all of the issues associated with ensuring efficient and consistent installations and approvals.

2.8 Accomplishments thus far in Equip 2020 include:

- Published the Final Rule Technical Amendment to change the ADS-B Out TSO from “meet requirements” to “meet performance requirements”. This change eliminates the implication that experimental or light sport aircraft needed to obtain design or production approval for their ADS-B out solutions.
- Published the ADS-B out GPS receiver transition period exemption process (see paragraph 2.5 for further information).
- Developed an equipage tracking database to help track equipage trend, to promote awareness of available solutions and focus industry resources on those aircraft that do not already have solutions available.
- Obtained commitment from the aircraft certification services to prioritize ADS-B system certifications.
- Conducting ongoing outreach to operators, installers and equipment manufacturers.

2.9 Many airlines equipped early on with GPS as part of the transition to satellite-based navigation, however this early equipage does not include the latest GPS receivers. Early-generation GPS receivers may experience brief outages of the FAA’s required performance for ADS-B Out. Airplane manufacturers are upgrading GPS receivers across airplane models, but have said the upgraded receivers will not be available until 2018 to 2020. Operators must install ADS-B Out by January 1, 2010 using earlier-generation GPS equipment that has been qualified for ADS-B. The FAA approved a five year limited exemption, applicable only from 91.227(c)(1)(i) & (iii) requirements under the following conditions:

- Each operator seeking exemption must notify the FAA.
- Operators covered under the exemption must develop and execute a plan to equip their aircraft to meet the requirements of 14 CFR §91.227(c) prior to January 1, 2025.
- Operators of SA-Aware equipped aircraft are not required to conduct pre-flight verification. They are exempted from the performance requirements in 14 CFR §91.225 when their ADS-B Out equipment is not predicted to meet the requirements of §91.227(c)(1)(i) and (iii).
- Operators of SA-On equipped aircraft must conduct pre-flight verification. They may operate in airspace specified in §91.225 when their ADS-B Out equipment does not meet the requirements of §91.227(c)(1)(i) and (iii) **and** the FAA determines there is a backup means of surveillance. The FAA plans to make this determination available through the SAPT.

2.10 This exemption is not an extension of the requirement as stated in part 91.227, but rather an acknowledgement that these operators were prepared to equip early and their efforts should be recognized and lauded. This exemption is applicable to both U.S. and foreign operators. Further detail can be found at; http://www.regulations.gov/#!documentDetail;D=FAA-2015-0971-0010.

2.11 The safety and operational benefits of ADS-B Out are significant, and the U.S. aviation community has worked collaboratively to identify the specific requirements and timelines that would allow for effective implementation into the U.S. national airspace system.

2.12 States with operators that intend to operate within the U.S. affected airspace are encouraged to promote awareness of this upcoming requirement. Timely installations will allow the approving authority to ensure that the equipage installations are compliant with the requirements; will allow the operators sufficient preparation to account for the expense and time needed to complete the installation; and will ensure that aircraft can operate in U.S. airspace on January 1, 2020.

3. CONCLUSION

3.1 The Conference is invited to note the information contained in this Paper.

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