Considerations on the use of 1090 MHz and 24-bit aircraft addresses

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1. **Frequency pair 1030 and 1090 MHz**
   - SSR/MLAT replies
   - TCAS/ACAS replies
   - ADS-B OUT
   - “Future expansions for ADS-B IN capability”
2. **24-bit aircraft address scheme**
   - correct configuration in aircraft is required to support communication and surveillance systems.
   - a finite and valuable asset

Two Issues identified by ICAO expert groups in relation to operation of unmanned aircraft

- **Exponential increase of the safety risk due to 1090 MHz congestion**
- **Future depletion of 24-bit aircraft addresses**

Increase of the safety risk due to 1 090 MHz congestion

A recent study indicates that:

- **large numbers of UA** (one UA per 2 square kilometres), each UA has 1 Watt or higher transmit power.
- **Operating at low level** (less than 500 feet above ground level)
- **In a typical high density terminal airspace** (760 ADS-B-equipped aircraft operating within a 200 NM radius and from ground level to FL180)

Can interfere with ADS-B ground station reception of ADS-B reports

Ground stations to become blinded - cannot see manned aircraft ADS-B reports

Therefore the study concluded that the operation of ADS-B OUT by a large number of UA raises a serious concern for the safety of other aircraft in the same airspace.

Future depletion of 24-bit aircraft addresses

- Some studies predict that based on the present growth of UA, there will be over a million such vehicles by 2025.
- The 24-bit aircraft address scheme was not designed for the high density of aircraft in an airspace that is foreseen for those UAs.

Impossible to accommodate all UA into the current scheme.

Note.- In some situations, UA may require a 24-bit aircraft address, for instance if the UA fly in controlled airspace or in proximity to traditional manned aircraft.

To assist States in validating the utilization of 1 090 MHz and for withholding 24-bit aircraft addresses

States are urged to:

1) **perform radio frequency spectrum analysis** to analyse the degree of congestion of 1 090 MHz and **based on the outcome of this analysis, consider how 1 090 MHz ADS-B UA operations might impact the performance** of the air navigation service provider (ANSP)-operated surveillance systems in airspace of interest as well as the automatic collision avoidance systems on board aircraft operating in that airspace;

Note.- The relevant State Letter and the guidance material will be published in due course.

To assist States in validating the utilization of 1 090 MHz and for withholding 24-bit aircraft addresses

States are urged to:

2) **formulate the circumstances and define procedures** to determine the potential requirement for 1 090 MHz ADS-B OUT equipage on UA, **in order to allow or prohibit such equipage as appropriate**. During this process, States should consider:

- the degree to which individual UA may or may not require air traffic services. And
- the degree to which the operation of individual UA may or may not interoperate in the airspace with traditional manned aircraft.

Note.- The relevant State Letter and the guidance material will be published in due course.

To assist States in validating the utilization of 1 090 MHz and for withholding 24-bit aircraft addresses

States are urged to:

3) In cases where UA are not required to equip with ICAO-compliant aeronautical surveillance equipment, States should not allocate then 24-bit aircraft addresses.

24-bit aircraft address allocation should be a part of the UA registration or operator approval process.

Note.- The relevant State Letter and the guidance material will be published in due course.

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