*International Civil Aviation Organization*

**THE THIRD MEETING OF MODE S DOWNLINKED AIRCRAFT PARAMETERS WORKING GROUP (MODE S DAPs WG/3)**

Web-conference, 12 – 15 May 2020

**Agenda Item 8**: Next meetings and any other business

# ALLOCATION OF 24-BIT AIRCRAFT ADDRESSES

(Presented by Singapore)

**SUMMARY**

This paper discusses the current allocation scheme for 24-bit addresses and its challenges.

## 1. INTRODUCTION

1.1 According to ICAO Annex 10 Volume 3, 24-bit aircraft addresses are allocated by ICAO to State of Registry or common mark registering authority. No two aircraft shall have the same address. To achieve this, blocks of addresses are allocated to States. Each block is defined by a fixed pattern of the first 4, 6, 9, 12 or 14 bits of the 24-bit address. Thus, blocks of different sizes (1,048,576, 262,144, 32,768, 4,096 and 1,024 consecutive addresses) are made available.

1.2 Such 24-bit addresses are necessary for, *inter alia*, Mode S operations. With ADS-B and Mode S mandates coming into effect around the world, aircraft that used to operate without aircraft addresses will have to be assigned with one.

## 2. INSUFFICIENT ADDRESSES IN SOME STATES

2.1 In the last decade, some States with the small blocks of addresses (4,096 or less) have developed their air hubs. Such States will typically have hundreds of State registered aircraft and large airports with A-SMGCS. The A-SMGCS, which require airport surface vehicles (in the order of hundreds) to be equipped with ADS-B transponders, will further deplete the number of available addresses available to the State.

2.2 Annex 10 Volume 3, Appendix to Chapter 9, 4.4 states:
*Any future requirement for additional aircraft addresses shall be accommodated through coordination between ICAO and the States of Registry or common mark registering authority concerned. A request for additional aircraft addresses shall only be made by a registering authority when at least 75 per cent of the number of addresses already allocated to that registering authority have been assigned to aircraft.*

2.3 While the text mentioned "… have been assigned to aircraft", subsequent text seemed to imply that aircraft would also mean surface vehicles.

2.4 To this date, there were requests from two States made to ICAO for more aircraft addresses. No additional addresses have been allocated to requesting States yet.

2.5 While its possible for ICAO to allocate additional address to these States, such address are still limited. ICAO would like to be prudent regarding such allocations and wished to be assured that the State has done whatever necessary to optimise the use of the existing aircraft addresses, before issuing new addresses. ICAO also has the difficulty of advising States on best practises due to the lack of material.

## 3. PROVISIONS IN ICAO SARPS AND GUIDENCE MATERIAL

3.1 Thus far, it was emphasized in the SARPs that no two aircraft shall have the same aircraft address. The exception would be that surface vehicles might reuse the aircraft addresses if the aerodromes are spaced more than 1,000km apart.

3.2 Apart of State letters informing States that aircraft addresses are not meant for widespread equipage of drones, there were no material to provide advises on best practises to optimise the aircraft addresses.

## 4. POSSIBLE WAYS TO OPTIMISE AIRCRAFT ADDRESS ALLOCATIONS

4.1 The following possible ways to optimise aircraft address allocations are listed for discussion at the Surveillance Panel-Aeronautical Surveillance Working Group (SP-ASWG).

4.2 To reduce wastage on addresses used for aircraft, the addresses for de-registered aircraft may be recycled as early as possible to be re-allocated to another newly registered aircraft.

4.3 A huge number of aircraft addresses will be used on transponders on surface vehicles. Most States will assign a transponder with aircraft addresses “permanently” to the transponder of a vehicle until such a time when it is determined that the vehicle will no longer enter the airfield (e.g. after a contractor fulfilled his contract term for an airside service). A possible way will be to prepare a fixed number of transponders to be issued to vehicles just before they enter the airfield and to collect it right after the vehicle leaves the airfield. There will be a need to input the “flight ID” each time the vehicle enters the airfield. There could be safety implications when flight ID is entered wrongly.

## 5. OTHER CONSIDERATIONS FOR ALLOCATION

5.1 Some other non-technical considerations are as follows:

a) So far, the addresses are allocated in 5 different ‘standard’ block sizes (i.e. 1,048,576, 262,144, 32,768, 4,096 and 1,024 consecutive addresses). By allocating additional addresses, should the State be allocated a bigger ‘standard’ block (i.e. increase from 1,024 to 4,096) or just some random block size like 2,048?

b) It is noted that the addresses block allocated to some States were “back-to-back” with another State’s (e.g. Germany is allocated 001111----------, and UK is allocated 010000----------) and others have spares addressed in between (e.g. Qatar is assigned 00000110101000---------- and the next block is 000001101100---------- assigned to Central African Republic). Should the additional addresses allocated to the State be continuous from the existing addresses?

## 6. FOLLOW UP

6.1 The SP-ASWG has tasked its Technical Sub-group (TSG) to investigate/identify options for additional allocation of 24-bit aircraft addresses to States who currently have a small number of addresses (such as 1024) and for allocating codes to surface vehicles. The results will be reported back to a future SP-ASWG meeting (likely in end March 2020).

## 7. CONCLUSION

7.1 The meeting is invited to note the information contained in this paper;

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