International Civil Aviation Organization

The Combined Tenth Meeting of the South Asia/Indian Ocean ATM Coordination Group (SAIOACG/10) and Twenty—Seventh Meeting of the South-East Asia ATS Coordination Group (SEACG/27)

Video Teleconference, 29 March – 02 April 2021

Agenda Item 3: Review of Current Operations and Problem Areas

MODE S CONSPICUITY CODE

(Prepared by the Secretariat)

SUMMARY

This paper provides an update on developments arising from Sixth Meeting of the ATM Sub-Group of APANPIRG (ATM/SG/6, Hong Kong, China, 30 July – 03 August 2018), relating to the Asia/Pacific Secondary Surveillance Radar (SSR) Codes Allocation Plan, as also discussed at ATM/SG/8 in 2020).

1. INTRODUCTION

1.1 The Secondary Surveillance Radar (SSR) Codes Allocation Plan of the Asia and Pacific Regions is based on the allocation of discrete Mode A codes for each flight, by the departure FIR. The availability of Mode A codes is limited, and an increasing number of flights in the region may result in capacity constraints and duplication of code assignments to aircraft as Mode A code allocations become fully used.

1.2 Mode S SSR and associated ATM system capability provide an opportunity to move away from using discrete Mode A codes for aircraft identification – instead using the transmitted Aircraft Identification and, to a lesser extent, ICAO Aircraft Address to support coupling of radar tracks to flight plans.

1.3 Australia and the Co-Chairs of the Surveillance Implementation Coordination Group (SURICG) provided information to ATM/SG/6 identifying future requirements for a regional Mode Select (Mode S) Secondary Surveillance Radar (SSR) conspicuity code. The information provided noted the typical allocation processes for discrete Mode A SSR codes, and the assignment of blocks of codes to Asia/Pacific Administrations in the APAC Air Navigation Plan (ANP).

2. DISCUSSION

2.1 Within the Asia/Pacific Region, Mode A codes are used as the basis for aircraft identification, typically through the allocation of a discrete SSR code to a flight using a process such as the following:

- the flight data processing system responsible for the first SSR-surveilled airspace entered allocates a SSR code (derived from Table ATM II-APAC-2 SSR CODES ALLOCATION PLAN in Vol II of the APAC Air Navigation Plan - eANP);
- the flight is assigned a discrete SSR code prior to departure, or on contact with Air Traffic Control; and

- the assigned SSR Code is coordinated to downstream FIRs via the Departure (DEP) message and/or via AIDC. Ideally, the flight will retain its code for the duration of the flight, but in some cases may need to change code entering a new FIR.

2.2 Table ATM II-APAC-2 SSR CODES ALLOCATION PLAN in Vol II of the APAC eANP provides each FIR with a range of SSR codes for International (leaving the FIR) or Domestic (within the FIR) use. The numbers of codes allocated to each FIR is intended to account for traffic patterns within the region, and numbers of flights originating from each FIR, the objective being to minimize the possibility of 2 or more flights being assigned the same SSR code while in the same radar coverage area.

2.3 Where the same SSR code is used for 2 or more flights at the same time, in overlapping radar coverage volumes, and this is the primary means of associating a radar track to a flight plan, the possibility of incorrect identification is increased.

2.4 As traffic volumes increase, the finite number of discrete Mode A SSR codes will mean more likelihood of the same code being assigned to multiple aircraft in the airspace, increasing risk of mis-identification.

2.5 An alternative to using a discrete SSR code for identification and coupling to a flight plan is to use the Mode S Aircraft Identification and/or ICAO Aircraft Address. This requires states to use Mode S radar systems, and have suitable ATM system capabilities.

2.6 The Surveillance Strategy for the Asia/Pacific Region, adopted by APANPIRG/27 in 2016 includes:

> *6. Make full use of aircraft Mode S capabilities where suitable surveillance systems are available to reduce reliance on 4-digit octal codes……*

2.7 Mode S radars are being deployed across the Asia/Pacific region, however it is expected that many states will continue to rely on Mode A/C radars for a number of years to come.

2.8 Any use of a Mode S conspicuity code by a state, or coordinated across multiple states, requires a full Mode S radar environment[1], aircraft being Mode S ELS capable, and compatible ATM system capabilities. Use of a non-discrete conspicuity code for aircraft identification is not generally compatible with a Mode A/C surveillance environment. A Mode S equipage mandate for aircraft is not essential for the use of a Mode S conspicuity code, but may be preferred by some States as they move to implementation.

2.9 It should also be noted that ICAO Annex 6 requires that all turbine-engined aeroplanes of maximum take-off mass in excess of 5700 kg or authorized to carry more than 19 passengers shall be equipped with an airborne collision avoidance system (ACAS II). In the vast majority of cases compliance with this requirement is achieved through ACAS-enabled Mode S SSR transponder equipage.

2.10 The European SSR Code Management Plan 2010 (EUR DOC 023) identified the use of the Mode S Conspicuity Code A1000 for aircraft identified via the downlinked Aircraft Identification through Mode S Elementary Surveillance (ELS).

[1] Includes environments where Mode A/C/S SSR interrogations are simultaneously applied.

2.11 The Combined Sixth Meeting of the South Asia – Indian Ocean ATM Coordination Group and 23rd Meeting of the South East Asia ATS Coordination Group (SAIOACG/6 & SEACG/23) in March 2016 was informed of the India's trial implementation of a non-discrete Mode A SSR conspicuity code by Mode S SSR transponder equipped aircraft operating between specified city pairs. The conspicuity code used in the India's trial was A1000, which aligned with the practice in Europe.

2.12 Code A1000 was proposed as the Mode S Conspicuity code in the Asia Pacific region. As this code has already been allocated for this purpose in Europe; selection of the same code in Asia Pacific is a further step towards a seamless ATM environment for aircraft operating between Europe and Asia Pacific – noting however that it is likely to be many years before all states will be able to support this capability across EUR and APAC.

2.13 ATM/SG/6 noted the relevant sections of the *Asia/Pacific Seamless ATM Plan (now Seamless ANS Plan)*, the *Surveillance Strategy for the Asia/Pacific Region*, the *European SSR Code Management Plan 2010* and India's trial non-discrete Mode A SSR conspicuity code implementation. The following Conclusion was agreed:

> ***Conclusion ATM/SG/6-3: Proposed Air Navigation Plan Volume II Amendment***
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> *That, a Proposal for Amendment (PfA) to the APAC Air Navigation Plan Volume II at* ***Appendix C to the Report*** *be submitted, withdrawing Mode A SSR Code A1000 from Table ATM II-APAC-2 and identifying it as the Mode S conspicuity code for the APAC Regions.*

2.14 Proposal for Amendment (PfA) to the Asia/Pacific (APAC) Regions Air Navigation Plan (ANP) serial number 18/05 was circulated to all Asia/Pacific Administrations, and subsequently reached Air Navigation Agreement (ICAO State Letter AP080-20 – ATM refers). Accordingly, APAC ANP Vol II includes the following:

> *Part IV – AIR TRAFFIC MANAGEMENT (ATM)*
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> *3. SPECIFIC REGIONAL REQUIREMENTS*
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> *3.6 Mode A Code A1000 is reserved for use as a conspicuity code for Mode S equipped aircraft, operating in airspace under Mode S surveillance, where Aircraft Identification (Flight ID) is used for unambiguous ATC identification of aircraft and to enable coupling of the ATS surveillance system information with the flight plan.*

2.15 Code A1000 has been removed from the ANP Table ATM II-APAC-2 SSR – *Codes Allocation Plan of the Asia and Pacific Regions*.

2.16 Further, the Asia/Pacific Seamless ANS Plan V3.0 now states:

> *ATS Surveillance*
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> *7.27 ADS-B (using 1090ES), MLAT or radar surveillance systems should be used to provide coverage of all Category S airspace as far as practicable, and Category T airspace supporting international aerodromes, consistent with* ***ASUR-B0/1 – 2****. Data from ATS surveillance systems should be integrated into operational ATC aircraft situation displays (standalone displays of ATS surveillance data should not be used operationally).*
>
> *…*

Note 3: ATC units operating within controlled airspace wholly served by Mode S SSR and/or ADS-B surveillance should implement the use of the standard non-discrete Mode A code 1000 for Mode S transponder equipped aircraft to reduce the reliance on assignment of discrete Mode A SSR codes and hence reduce the incidence of code bin exhaustion and duplication of code assignment.

2.17 The Administrations responsible for the following Flight Information Regions (FIRs) requested to note that code A1000 has been removed from their allocation:

- Bangkok (Domestic allocation);
- Brisbane (International allocation);
- Fukuoka (Domestic allocation);
- Shanghai (Domestic allocation);
- Shenyang (Domestic allocation);
- Taibei (Domestic allocation); and
- Urumqi (Domestic allocation).

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

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