International Civil Aviation Organization

Thirteenth Meeting of the Air Traffic Management Sub-Group (ATM/SG/13) of APANPIRG

Singapore, 25 – 29 August 2025

Agenda Item 6: ATM Coordination (Meetings, Route Development, Contingency Planning)

MEASURES TO ENHANCE SAFETY AND EFFICIENCY ON A593 WITHIN INCHEON FIR

(Presented by Republic of Korea)

SUMMARY

This paper aims to share measures to enhance airspace safety and efficiency in the SADLI-LAMEN segment on A593. This segment remained as Large Height Deviation (LHD) Hotspot B1 by the Regional Airspace Safety Monitoring Advisory Group (RASMAG) due to high rate of LHD occurrences mainly caused by ATC coordination errors over SADLI, transfer of control point between Incheon and Shanghai ACCs. To improve safety and efficiency of the airspace, the Republic of Korea proposes to implement the measures that is included in the Phase 2 of A593 normalization plan, namely implementation of ATS inter-facility data communication (AIDC), triple routes, reduction of longitudinal separation, safety oversight etc.

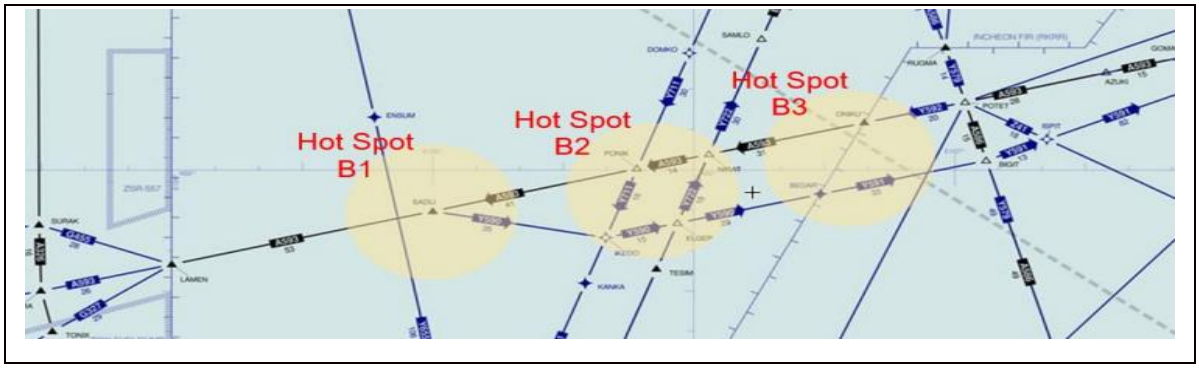
1. INTRODUCTION

1.1 Since the implementation of the A593 Normalization Plan on 25 March 2021, there has been significant enhancement of safety, capacity and efficiency of the east side of SADLI of A593 by establishing parallel routes and implementing ATS inter-facility data communication (AIDC) between Incheon and Fukuoka ACCs, which results significant reduction in safety events including large height deviation (LHD) occurrences. However, the west side of SADLI is still under the former corridor scheme using single route, manual transfer of control between ACCs and longer longitudinal separation causing lots of LHD occurrences with the airspace.

1.2 In this reason, the Twenty-Ninth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/29, Bangkok, Thailand, 19-22 August 2024) agreed to divide LHD Hotspot B (LAMEN-ONIKU segment of A593) into B1, B2 and B3 and remove B2 and B3 from the Asia Hotspot list (**Table 1**) considering no LHD occurrence for three years and safety improvement measures including AIDC implementation. However, Hotspot B1 remained due to the number of LHD occurrences and no safety improvement initiatives or measures taken.

Table 1: APAC Hotspot B

Name	Involved FIR	Hotspot
B1	INCHEON (TOC point of Incheon ACC and Shanghai ACC)	Continued
B2	INCHEON (Intersection of A593, Y590, Y711 and Y722)	Deleted
B3	INCHEON and FUKUOKA	Deleted



1.3 The Thirtieth Meeting of RASMAG (RASMAG/30, Bangkok, Thailand, 14-17 July 2025) noticed that the number of LHDs on the Hotspot B1 was 126, which increased by 70.3% compared to 2023 (**Table 2**), and among them, 123 cases were caused by human errors such as no transfer, late transfer, or no light level revision. In addition, the meeting recognized LHD event sharing mechanism between China and the Republic of Korea that represents a significant progress on monitoring airspace safety. However, it concluded that the safety mitigation measures are not sufficient to reduce LHD events and decided to remain Hotspot B1 on the list until the number of LHDs decreases.

Table 2: LHD Occurrences on Hotspot B1

Interface	2021	2022	2023	2024
Between Incheon ACC and Fukuoka ACC	0	0	0	-
Between Incheon ACC and Shanghai ACC	21	108 (414.3%)	74 (-31.5%)	126 (70.3%)

1.4 Traffic volume also affects airspace safety. The traffic volume on A593 (**Table 3**) in 2024 was recovered by 93% compared to 2019. In addition, the average daily traffic volume in the first half of 2025 was 988, which is already exceeding the volume in 2019, which may cause continuous LHD occurrences caused by human errors.

Table 3: Traffic Volume on A593

Year	2019	2020	2021	2022	2023	2024	1st half, 2025
Total	358,052	125,940	109,356	131,400	268,363	335,490	180,829
Daily(Average)	981	344	300	360	735	917	988
Compared by 2019	-	35%	31%	37%	75%	93%	101%

1.5 Considering these situations, this paper explains why the Phase 2 of A593 Normalization Plan that includes various safety and efficiency measures such as AIDC, triple routes, reduction of longitudinal separation, safety oversight, etc. needs to be implemented in the airspace between SADLI and LAMEN of A593.

2. DISCUSSION

Establishment of AIDC

2.1 At the Third Meeting of the Asia/Pacific ATM Automation System Task Force (ATMAS TF/3, 7-10 June 2022), China mentioned that they were planning to implement AIDC between Incheon and Shanghai ACCs from the third quarter of 2023. To prepare for this, the Republic of Korea completed the installation of AIDC system compatible with various technical requirements in June 2023 and proposed to begin the test operations during the 10th Meeting of China-ROK ATM/CNS Coordination (Shanghai, China, 9-12 September 2024). However, China expressed difficulties in implementing AIDC due to technical issues and regulatory approvals.

2.2 RASMAG/30 noted that the AIDC Implementation and RASMAG Hotspot Chart prepared by ATMAS TF/6. **Figure 1** shows that most Hotspots on the FIR boundaries were closed related to AIDC implementation, either not implemented or trial operational status. This infers that AIDC could contribute to the reduction of LHDs caused by human errors and enhance airspace safety.

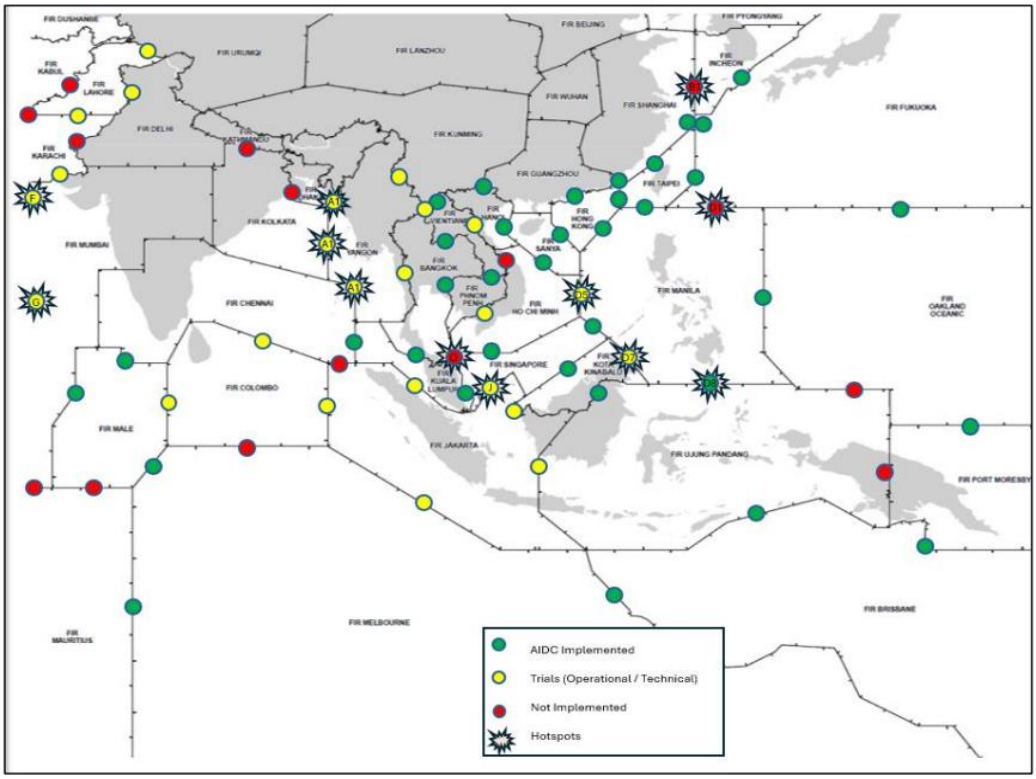
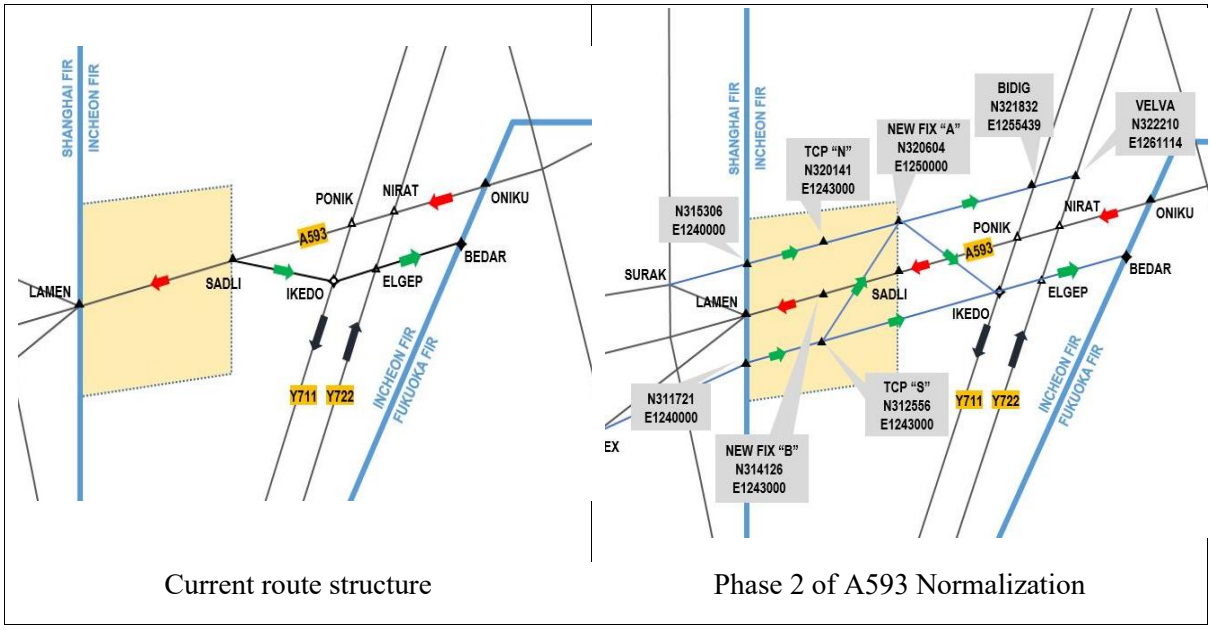


Figure 1: AIDC Implementation and RASMAG Hotspot Chart

2.3 Recognizing this and other considerations on that airspace, RASMAG/30 noted that China and the Republic of Korea agreed to continue bilateral discussion to discuss mitigation measures including Phase 2 and the matter related to AIDC implementation could be raised at ATMAS TF or RASMAG. In addition, ICAO Asia and Pacific Office could assist on this matter when required.

Establishment of Triple Routes

2.4 Currently, the east of SADLI of A593 is operated by parallel routes while the west of it is single route. This causes bottleneck phenomena over SADLI causing increase workloads and fatigue of air traffic controllers and safety risks while reducing airspace capacity. To resolve this issue, it needs to be considered either extension of Y590 parallel to the A593 to the Shanghai FIR or implementation of triple routes contained in the Phase 2 of A593 Normalization Plan as soon as possible (**Figure 2**).



Current route structure | Phase 2 of A593 Normalization

Figure 2: Proposal for the New ATS Route Structure on A593

2.5 When implementing triple routes, it needs to be considered the adjustment of transfer of control points (TCPs) either technically or operationally in the route structure. The triple routes create two crossing points on A593 used for transitioning to Incheon or to Fukuoka ACC, which makes it difficult for traffic bound for Shanghai ACC to change levels on A593. Once TCPs are adjusted to the midpoint of SADLI-LAMEN segment, Incheon ACC will have some time and space to separate east bound aircraft from aircraft flying north and south on Y711 and Y722, which especially is beneficial during weather deviation.

Reduction of Longitudinal Separation

2.6 In order to resolve bottleneck over SADLI, it needs to reduce longitudinal separation requirements to aircraft bound for Shanghai ACC. Currently, the longitudinal separation requirement for aircraft from Incheon ACC to Shanghai ACC is 10 minutes (50~60NM), which is much greater than the ICAO recommendation, 10 NM in surveillance environment. The Fourteenth Air Navigation Conference (Montreal, Canada, 26 August to 6 September 2024) ***Recommendation 3.1/1: Project 30/10 – Optimized implementation of longitudinal separation minima***

That States:

a) within the processes of the planning and implementation regional groups, actively collaborate with neighbouring States to implement Project 30/10 – implementation of longitudinal separations of 55.5 km (30 NM) or less in oceanic and remote airspace, and 19 km (10 NM) or less elsewhere;

2.7 Considering traffic volume is expected to continue to increase in this airspace, it is necessary to reduce the required longitudinal separation for aircraft bound for Shanghai ACC.

Oversight Over the Delegated Airspace

2.8 According to Annex 11 paragraph 2.1, it is inferred that a State having accepted the responsibility to provide air traffic services over high seas shall arrange for the services to be established and provided in accordance with Annex 11. A State may also delegate to another State the responsibility for establishing and providing air traffic services over high seas within FIR. If another State takes other State's responsibility to provide air traffic services over high seas, providing State's responsibility is limited to technical and operational areas for the safety and expedition of aircraft of that airspace.

2.9 The Republic of Korea has delegated a portion of airspace between SADLI and LAMEN of A593 to China and Shanghai ACC is providing air traffic services of that airspace. In this case, the Republic of Korea is responsible for the oversight to the Shanghai ACC on the provision of air traffic services in line with ICAO provisions.

2.10 Recognizing this, the Korea Office of Civil Aviation (KOCA) sent a correspondence to the Civil Aviation Administration of China (CAAC) to discuss this issue in January 2022. The CAAC expressed its expectation to improve safety and efficiency of air navigation services through cooperation in its response in October 2022. However, here was no more response on the safety oversight issue afterwards.

2.11 In respect to paragraph 1.3, there was an agreement on the LHD event sharing mechanism between China and the Republic of Korea in April 2025. It is truly a significant improvement on safety monitoring over delegated airspace. However, it is not sufficient to oversee overall airspace safety, as it is limited to the LHD events in the delegated airspace.

2.12 In this regard, it is proposed for China to share safety oversight information on the delegated airspace, such as reports on the non-compliance to ICAO provisions, safety performance analysis, safety risks and hazards, etc. with the Republic of Korea.

2.13 In terms of the sharing safety information, we can refer to the case between Canada and the United States. Since the 1960s, two States have delegated portions of their airspace along the borderline each other to provide air traffic services efficiently. As a result of airspace delegations, safety oversight is also carried out based on the agreements between two Sates aligned with each State's national regulations and ICAO provisions. Safety information collected and identified during the safety oversights was shared during bilateral meetings held once or twice a year.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) note the ongoing discussion between China and the Republic of Korea to implement measures above to enhance airspace safety and efficiency between SADLI and LAMEN of A593;

c) encourage the implementation of the Phase 2 of A593 Normalization Plan; and

d) discuss any relevant matters as appropriate.

— END —