International Civil Aviation Organization
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Agenda Item 3: Reports from Asia/Pacific RMAs and EMAs

AKARA COORDINATION PROGRESS REPORT

(Presented by the Republic of Korea)

SUMMARY

This paper aims to provide updates on the progress of consultations between the parties concerned and measures to strengthen safety for the normalization of Fukue-AKARA Corridor situated in Incheon Fight Information Region. It also intends to note the continuing efforts of ROK, China and Japan to ensure the complete transition to the new ATS route scheme at the earliest possible date, which has been postponed due to the COVID-19 crisis.

1. INTRODUCTION

1.1 The high-level coordination meeting on the Fukue-AKARA Corridor in the Incheon Flight Information Region (FIR) was held in Montréal, Canada, on 10 October 2018 during the Thirteenth Air Navigation Conference (AN-Conf/13). ICAO and three States concerned, ROK, China and Japan, have thereafter organized four rounds of Technical Working Group (TWG) meetings.

***Note**- TWG1 held in Beijing, China from 16 to 17 January 2019, TWG2 held in Tokyo, Japan from 19 to 20 March 2019, TWG3 held in Jeju, ROK from 3 to 4 July 2019, TWG4 held in Bangkok, Thailand from 7 to 8 November 2019*

1.2 "Update on the Fukue-AKARA Corridor in the Incheon flight information region" was presented by the ICAO secretariat during the Thirtith Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/30) held in Bangkok, Thailand, from 4 to 6 November 2019.

1.3 A potentially satisfactory compromise was presented by the ICAO Secretary General during the 218th session of ICAO Council held in Montréal, Canada, on 19 November 2019, garnering broad support from the parties concerned for its details proposed in the paper, to provide continuing support for the work of a renewed TWG to implement the new ATS route structure (See appendix A). China, Japan and ROK expressed their support and commitment to work together to resolve the AKARA corridor matter.

2. SAFETY MANAGEMENT OVER THE FUKUE-AKARA CORRIDOR

Safety assessment by PARMO in RASMAG meeting

2.1 The Corridor was identified as one of the five Large Height Deviation (LHD) hot spot areas in the Asia-Pacific Region of ICAO at the 20th meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/20) held in Bangkok on 26-29 May 2015. The Pacific Approvals Registry and Monitoring Organization (PARMO) Regional Monitoring Agency (RMA) was appointed to take the lead to address the issue and has been conducting safety assessment for the Corridor every year since 2015. The result of the assessment is provided below:

Year	2015	2016	2017	2018	2019
LHD duration time	1.8 min.	0.1 min.	-	0.15 min.	35.9 min.
Overall vertical collision risk	$46.2\times10\text{-}9^{-9}$	2.08×10^{-9}	1.75×10^{-9}	55.1×10^{-9}	247.0×10^{-9}

Table 1. Vertical safety assessment in Corridor

2.2 Except for 2016 and 2017, the Overall Vertical Collision risk exceeded the target level of safety of 5.0×10-9 fatal accidents per flight hour (fapfh). In particular, in 2019, the risk was reported to exceed about 50 times the target level, and the analysis has defined the reason as the increased reporting of LHD cases and the accompanying surge in the "duration" and "level crossed" that affect the operational vertical collision risk.

Safety Management in ROK

2.3 ***Strengthened Surveillance.*** The Incheon ACC has been operating a dedicated air traffic controller and inspector position since August 2019 to double up the monitoring of traffic flow during the peak time in the Corridor area. They are mostly working on datablock correlation of Chinese and Japanese aircraft so as to have them easily identifiable and separated from Incheon ACC controlled aircraft, and monitoring has also been strengthened to prevent safety issues even amid the contingency situation such as adverse weather.

2.4 ***ADS-B Establishment and Implementation.*** With the completion of ADS-B establishment in all areas of Incheon FIR on May 20, 2020, the SCAN cycle of the air route radar used by Incheon ACC was shortened from 5 to 12 seconds to 4 seconds. The radar display method used by Incheon ACC is a fusion of enroute radar and ADS-B data. The shorter monitoring cycle with the ADS-B has allowed air traffic controllers to identify more accurate data blocks and significantly improved blind area.

2.5 ***NOTAM Issuance***. The traffic volume and abnormal conditions of the Corridor has been on the continuous rise, raising flight safety concerns. Against the backdrop, ROK issued a NOTAM for Corridor area on September 6, 2019, to actively manage safety and to call attention to flight safety of airlines and pilots operating in the Corridor area.

2.6 ***Safety assessment***. The ROK conducted a series of qualitative safety risk assessments which identified some risk elements within a tolerable level, meaning acceptable based on risk mitigation but it may require management decision. The responsible team cited the followings as risk elements: a) the inappropriate ATS route structure that fails to reflect the present air traffic conditions; b) the delayed coordination procedures upon the occurrence of abnormal events in the AKARA Corridor area; and c) datablock overlapping on radar display. Risk mitigation measures were presented respectively as follows: a) a new route connecting ROK and China with a view to reducing the number of crossings at PONIK and NIRAT; b) the direct speech circuit installation for the regular ATC coordination between Incheon ACC and Shnaghai ACC, and c) overlapped datablock adjustment by personnel responsible for flight data position.

2.7 ***Flight inspection***. The ROK conducted flight inspections for navigational aid in the Corridor area in pursuit of assuming ATS provision responsibility by ROK and found no issue in frequency exchange and radar coverage.

3. RESULT OF SIMULATION ON THE NEW ATS ROUTE STRUCTURE

3.6 ***Simulation analysis by ROK***. The ROK has conducted Total Airspace and Airport Modeller by Boeing (TAAM) simulation tool against the current route and three options (See appendix B) generated by the previous TWG meetings, inclusive of potentially satisfactory compromise in terms of safety and efficiency. All three options aim to disperse traffic and avoid head-on conflict by adding new routes along the existing Corridor. They commonly propose: a) adding two new uni-directional routes along the current A593 route for east-bound traffic; b) using the current bi-directional A593 route in a unidirectional way for west-bound traffic. The traffic data includes the 24-hour traffic flown through the Corridor area that encompasses all the flights on Y711/Y722, China↔ROK traffic on A593 as well as China↔Japan traffic on A593.

3.6.1 Furthermore, current and alternative FLAS scenarios have also been considered in the simulation analysis. Current flight levels are allocated as FL240, FL280, FL300, and FL400 for westbound, FL250, FL290, FL310, and FL390 for eastbound, FL270, FL330, FL350, FL370, and FL410 for northbound and FL260, FL320, FL340, FL360, and FL380 for southbound, whereas alternative flight levels are allocated as FL240, FL280, FL320, FL360, and FL400 for westbound, FL250, FL290, FL330, FL370, and FL410 for eastbound, FL270, FL310, FL350, and FL390 for northbound, FL260, FL300, FL340, and FL380 for southbound.

3.6.2 ***Time and fuel savings***. Route option 2 with current FLAS is expected to reduce about 1.2 minute of flight time and 82kg of fuel for each flight, which is the best option. Overall, the current FLAS is expected to outperform the alternative FLAS in terms of flight time and fuel consumption. (82kg of fuel is equivalent to 58 USD worth of saving per flight in monetary terms, and this figure corresponds to a daily saving of 45,922 USD and 16,761,378 USD per annum.)

3.6.3 ***Passing frequency.*** In the analysis, a passing frequency is defined as any two flights passing through the intersection points (PONIK, NIRAT) within +/- 60 seconds of time interval and with +/- 1,000ft of vertical separation. At those intersection points, route option 1 with current FLAS is expected to reduce the passing frequency by 96.1%, which is the best option.

		Current	Current FLAS			Alternative FLAS		
			Option 1	Option 2	Oprion 3	Option 1	Option 2	Oprion 3
Flight Time	**Average (min/flight)**	22.0	21.9	20.8	22.0	21.8	20.9	22.0
	+/- (%)	-	-0.5	-5.5	0.0	-0.9	-5.0	0.0
Fuel Consu mption	**Average (kg/flight)**	1351.9	1345.2	1269.9	1352.9	1354.0	1278.4	1355.8
	+/- (%)	-	-0.5	-6.1	0.1	0.2	-5.4	0.3

Table 2. Flight Time & Fuel Saving

	Current	Current FLAS			Alternative FLAS		
		Option 1	Option 2	Oprion 3	Option 1	Option 2	Oprion 3
PONIK	38	2	12	2	4	6	4
NIRAT	13	0	0	3	0	0	6
All (PONIK + NIRAT)	51	2	12	5	4	6	10
+/- (%)	-	-96.1	-76.5	-90.2	-92.2	-88.2	-80.4

Table 3. Number of Two Flights Passing

4. CONCLUSION

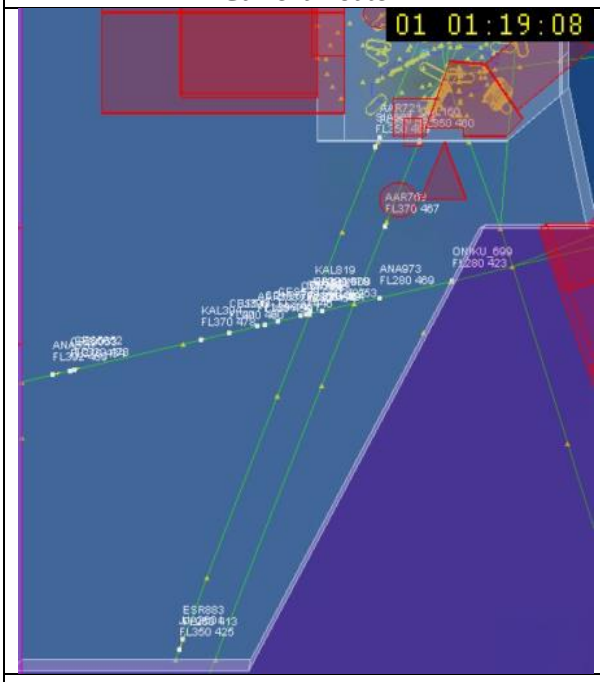
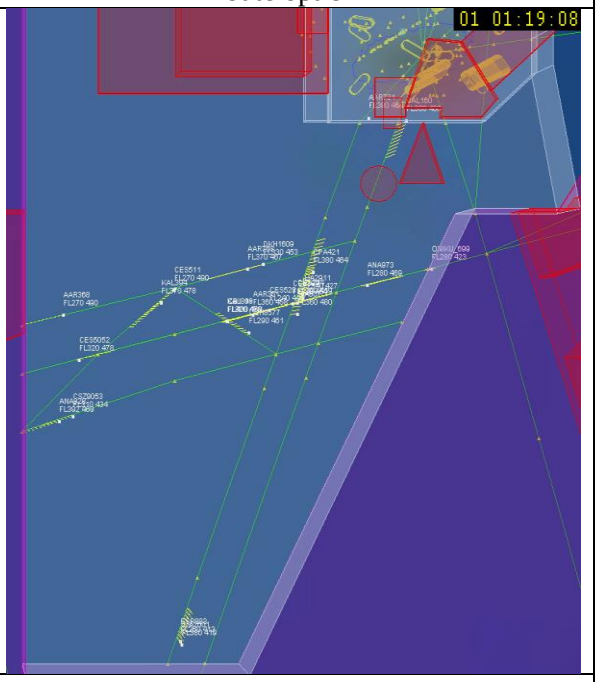
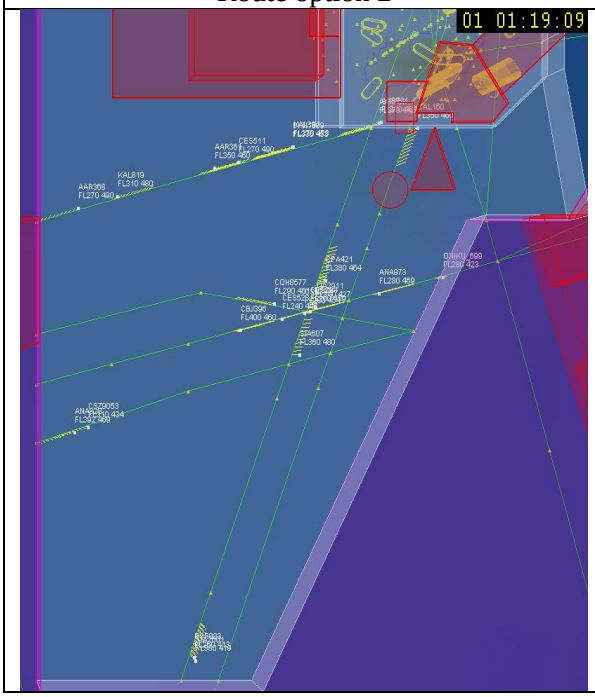
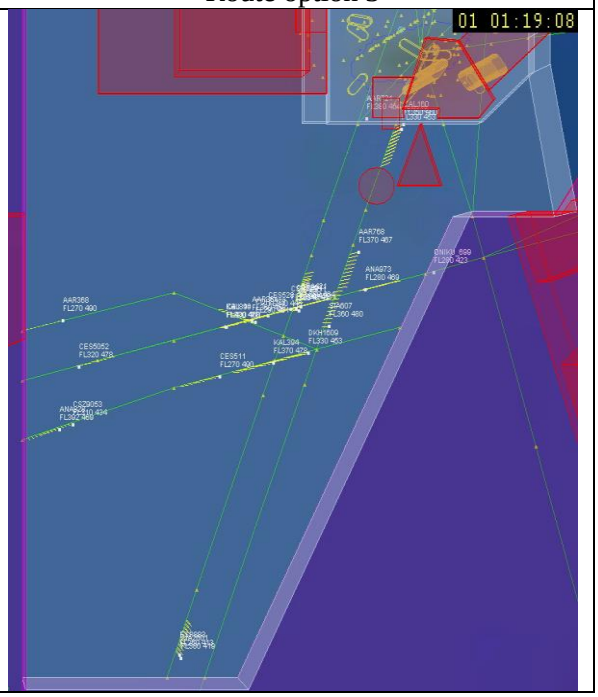
4.1 The ROK, China, Japan, and ICAO were working toward the target implementation date of 23 April 2020, but the negotiations have been delayed due to the sudden outbreak of the coronavirus disease. As Covid subsides across the continents, the parties concerned has recently resumed consultations in writing and through video teleconference.

4.2 While the current pandemic has temporarily reduced the air traffic volume, safety concern may resurge at any time with the expected increase of traffic in the future. As such, ROK is convinced that now is the timely moment for the transition to the new ATS structure, and wish to highlight the concerted efforts of the parties concerned in the course of the completion.

— END —

Appendix A. Proposed new ATS route structure

Appendix B. Current and three options in TAAM simulation

Current Route	Route option 1
	
Route option 2	**Route option 3**
	

Appendix C. Traffic analysis around the Corridor in 2019

1. ***Air Traffic Volume.*** The AKARA Corridor area saw a total of 354,000 flights in 2019, recording 7.8% annual average growth over the last seven years. Among the traffic volume, 138,000 flights used the AKARA Corridor (China-Japan route) and its annual growth stood at 9.8% over the last seven years. It is of particular note that between 2018 and 2019, the result reported 9.6% year-on-year increase in AKARA Corridor, 13.5% in the ROK-China route, and 10.8% in the ROK-Southeast Asia routes (Y711/Y722/B576).

<Air Traffic Volume: thousands>

Year / Route	2013	2014	2015	2016	2017	2018	2019	Compared to 2018	Avg. 7 years
AKARA Corridor	72	79	99	116	121	126	138	9.6%	9.8%
ROK-China	53	63	66	75	61	65	74	13.5%	4.7%
Y711/Y722/B576	84	89	88	103	118	128	142	10.8%	7.8%

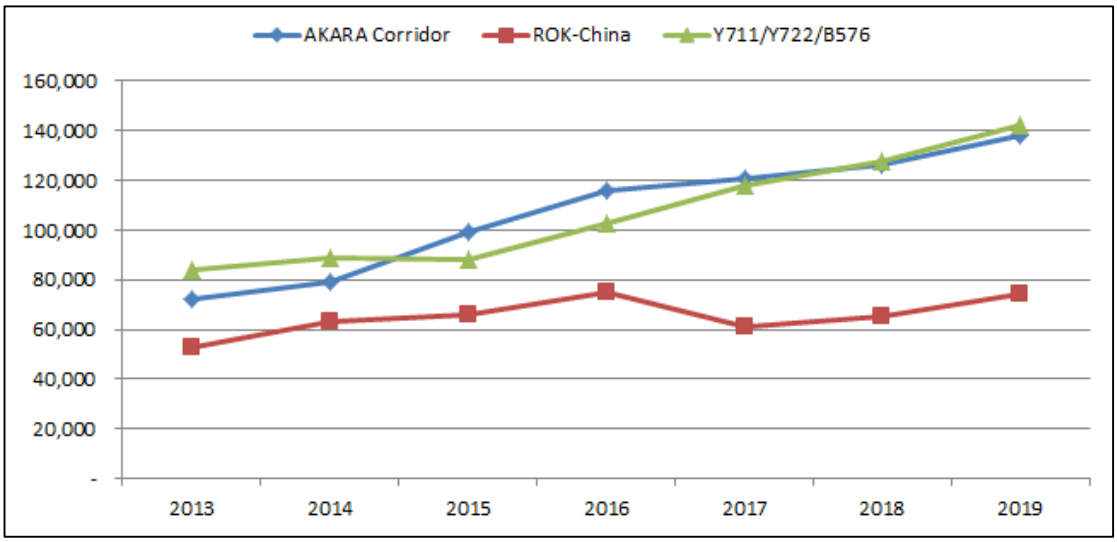


Figure 1. Annual Air Traffic Growth around the AKARA Corridor Area

2. ***Traffic by Time Slots.*** Figure 2 provides average daily traffic within the area per timeslot in 2019. It shows that the AKARA Corridor was congested in daytime, and early morning and evening were peak hours for Y711/Y722/B576.

Time / Route	00	01	02	03	04	05	06	07	08	09	10	11
AKARA Corridor	9	8	5	5	10	11	6	5	4	13	31	31
ROK-China	6	3	2	7	8	7	8	4	6	13	12	11
Y711/Y722/B576	12	7	8	16	17	21	15	23	22	18	14	15
	12	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
AKARA Corridor	20	22	27	29	24	22	31	19	14	12	10	8
ROK-China	14	11	11	13	8	9	6	12	9	6	7	10

Y711/Y722/B576	17	13	10	15	14	15	19	17	21	25	23	22

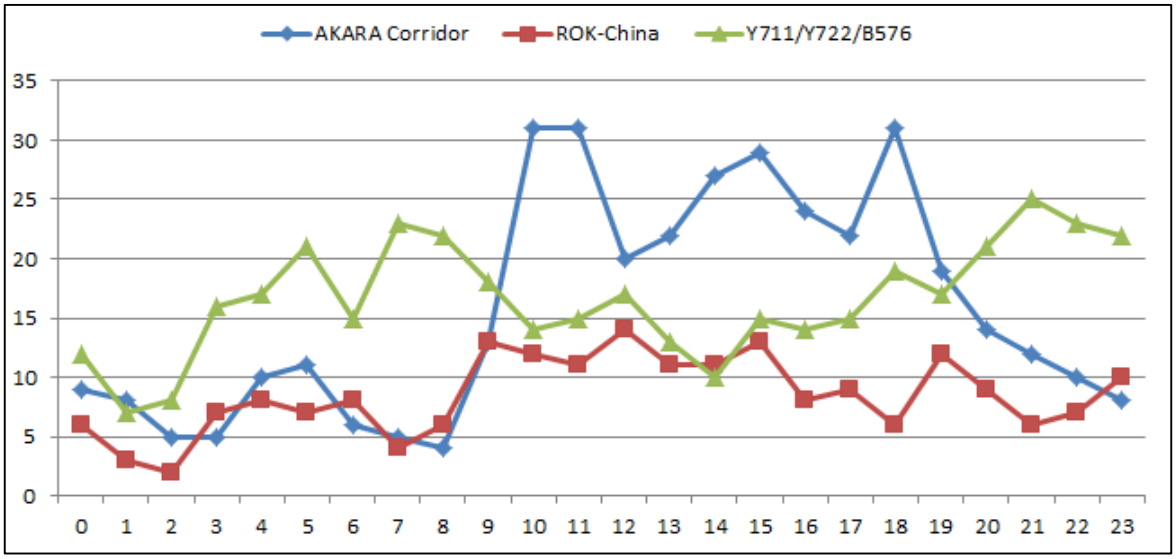


Figure 2. Traffic by time slot around the AKARA Corridor Area

3. ***Traffic by Flight Altitudes***. The 80% of traffic used altitudes at or below FL310 for the AKARA Corridor, and 93% of traffic used at or above FL320 on Y711/722/B576.

Flight level	**240**	**250**	**260**	**270**	**280**	**290**	**300**	**310**	**320**
AKARA Corridor	18	56	4	0	49	75	52	55	8
ROK-China	0	5	27	32	1	4	7	7	22
Y711/Y722/B576	0	0	6	1	0	5	6	9	33
Flight level	**330**	**340**	**350**	**360**	**370**	**380**	**390**	**400**	**410**
AKARA Corridor	0	15	0	15	0	6	21	11	0
ROK-China	26	22	10	19	9	6	4	1	2
Y711/Y722/B576	35	56	49	52	51	37	27	15	17

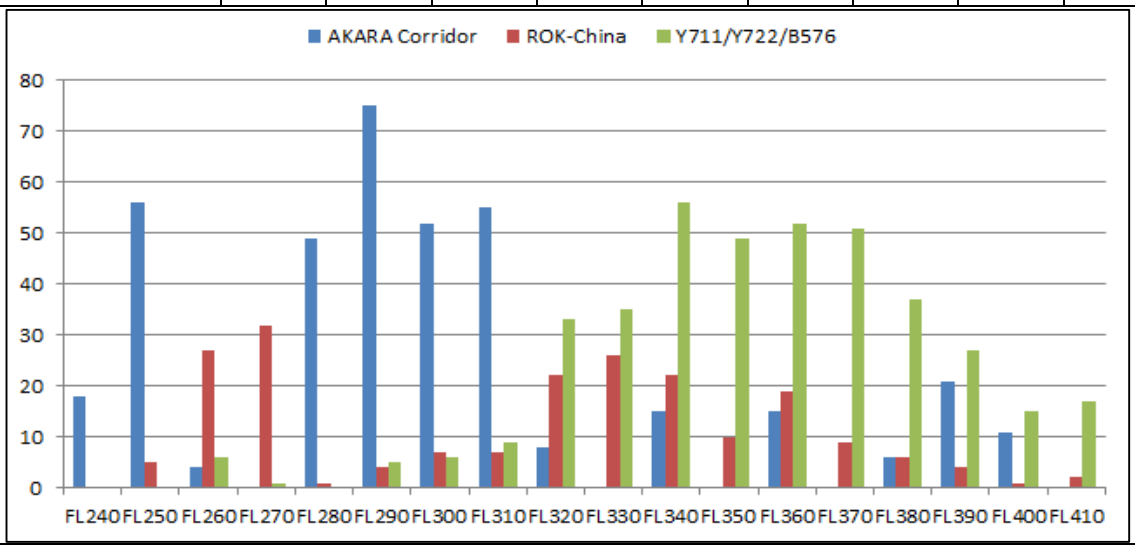


Figure 3. Traffic by flight levels around the AKARA Corridor Area