55th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

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AGENDA ITEM 4 : AIR NAVIGATION

IMPROVED AIRPORT OPERATION THROUGH A-CDM AND AMAN/DMAN IMPLEMENTATION OF THE REPUBLIC OF KOREA

Presented by the Republic of Korea

INFORMATION PAPER

SUMMARY

This paper presents the implementation status on airport collaborative decision-making (A-CDM) and integrated arrival and departure management (AMAM/DMAN) to improve airport operations and flow management in the Republic of Korea (ROK).

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1. INTRODUCTION

1.1 The Aviation System Block Upgrades (ASBU) is a global technical framework to drive the evolution of the global air navigation system and improve air navigation capacity and efficiency. The current ASBU concept is linked to four aviation performance improvement areas (PIAs), namely: Airport operations (PIA1); Globally-interoperable systems and data (PIA2); Optimum capacity and flexible flights (PIA3); and Efficient flight paths (PIA4).

1.2 ICAO APAC seamless ATM Plan also considers CDM serving busy terminal airspace and major traffic flow management as an important factor.

1.3 Aligned with the above ICAO's ASBU PIAs and the seamless ATM plan, the Republic of Korea (ROK) has been initiating several projects focused, especially, on improvement of airport operations (PIA1). This paper presents the ROK's efforts to improve airport operations through the implementation of airport collaborative decision-making (A-CDM), and integrated arrival and departure management (AMAM/DMAN). These projects have been progressed as some of main tasks of the ROK's national air navigation plan, so called the National ATM Reformation and Enhancement (NARAE), which has been implemented since 2013.

2. DISCUSSION

2.1 Airport collaborative Decision-Making

2.1.1 The A-CDM has been implemented at the Incheon International Airport since December 2017. The A-CDM allows to optimize airport operations and decisions in a collaborative environment by sharing information between all stakeholders. Furthermore, it enables to respond to the increasing traffic growth, efficiently utilize limited resources and reduce arrival and departure delays.

2.1.2 The A-CDM allows all stakeholders to ensure common situational awareness, and predict the target time based on accurate forecasting. The success of A-CDM depends on collaboration and efforts of A-CDM partners. Individual partners exchange their flight operational information and related constraints via A-CDM portal system, which is an integrated information system connected with relevant stakeholders' operation system, such as air traffic flow management (ATFM), air traffic control (ATC), apron management, aircraft operation, flight information, ground handling, advanced surface movement guidance and control system (A-SMGCS), etc.

Figure1. Incheon A-CDM Portal and Information Flows

2.1.3 Incheon A-CDM process is based on the milestone approach to track the progress of the flight event. For the arrival process, it consists of seven milestones and fourteen time information including estimated landing time (ELDT) and estimated in block time (EIBT). Target off block time (TOBT) for the departure flight is automatically calculated based on ELDT and EIBT considering the turnaround process.

2.1.4 Departure milestones of Incheon A-CDM consist of nine milestones and share twenty-seven time information including de-icing process. Aircraft operators and ground handling agents can modify the auto-calculated TOBT depending on the passenger/baggage handling service and ramp service. ATC units provide target start-up approval time (TSAT) and target take off time (TTOT) considering the latest TOBT, calculated take off time (CTOT) and ground situation.

2.1.5 According to the results of benefit analysis of A-CDM from January to June 2018, the average taxi-out time was reduced by 8.1% (1.5 minutes per flight) and the average taxing fuel was reduced by 9.8% (77 lbs per flight) comparing to that of 2017, respectively. This has shown as consequences of various factors including not only the A-CDM implementation but also the opening of second passenger terminal of the Incheon Airport.

2.1.6 The Incheon A-CDM operation will be upgraded by three-phased approach as follows:

a) Phase 1 (December 2017 – December 2019): Share basic time information with relevant stakeholders via A-CDM portal system;
b) Phase 2 (January 2020 – December 2024): Improve information accuracy of TTOT/TSAT by upgrading Departure Management (DMAN), and expand the scope to cover de-icing/anti-icing process; and
c) Phase 3 (January 2025 –): Implement automated A-CDM by using advanced technology such as artificial intelligence, and improve information quality exchanged with ATFM.

2.1.7 According to the ROK's national air navigation plan, A-CDM will be introduced to mid-sized airports including Gimpo, Gimhae and Jeju airports by a three-phased development plan as follows: design phase (June 2018 - December 2018), installation phase (January 2019 - December 2019), and trial and full operation phase (January 2020 - December 2020).

2.2 Integrated arrival and departure management

2.2.1 In order to improve traffic flow, airport operation and reduce unnecessary flight delays, the ROK has been also developing the Management on Integrated operations of Departure, Arrival, and Surface (MIDAS) as a runway sequencing system since 2014. A test-bed for the MIDAS operation was designated to Incheon and Jeju international airport. The objective of MIDAS is to secure flight safety, minimize arrival and departure delay and increase airport operation efficiency. The basic operational concept of MIDAS is summarized and shown as follows:

a) Departure Management (DMAN): schedule the pre-departure sequence proposed in conjunction with A-CDM by reflecting departure restrictions. Departure scheduling horizon is extended to the metering fix at airway so that the en-route traffic situation can be considered as a constraint during the runway scheduling process. Taxiway scheduling is also incorporated considering real-time ground situation, runway/taxiway configuration, etc; and

b) Arrival Management (AMAN): schedule the arrival sequence and target landing time of aircraft entering the terminal control area (TMA) in consideration of the separation interval, and advise air traffic controllers of relevant time information and optimized route information, under the condition of executing point merge procedure.

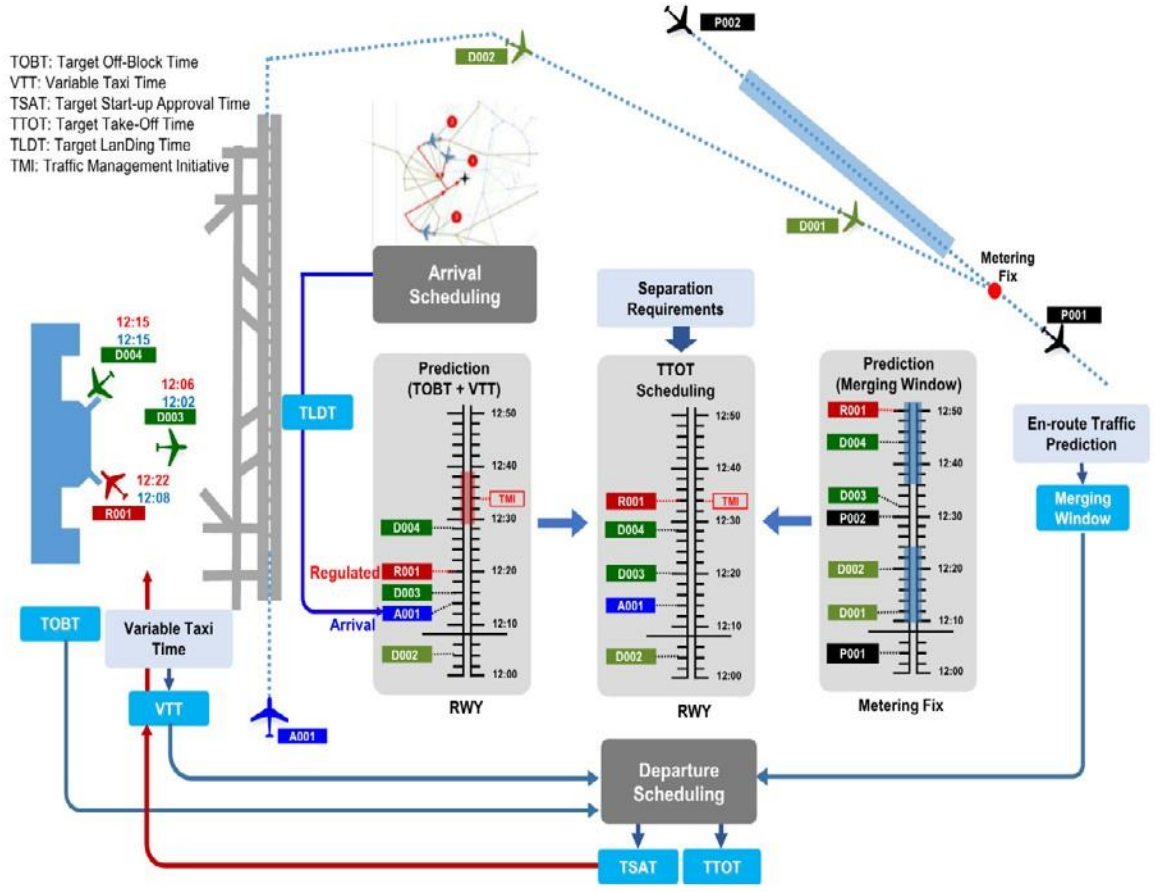

Figure2. Operational Concept of MIDAS

2.2.2 A prototype of MIDAS (DMAN) was deployed at Incheon International Airport in June 2018 and the field evaluation will be continued until 2020. The initial evaluation results from June to August 2018 have shown that the MIDAS can efficiently manage the departure flights in consideration of several constraints including but not limited to traffic management initiatives (TMI), which is a departure restriction frequently issued by adjacent ATC units. In addition, a prototype of MIDAS (AMAN&DMAN) will be installed at Jeju International Airport in 2019, and its field evaluation for the integrated operation of arrival and departure management will be conducted until 2020.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to note the information contained in this Paper.

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