



International Civil Aviation Organization

Second Meeting of the Asia/Pacific Airport Collaborative Decision Making Task Force (APA-CDM/TF/2)

Hong Kong, China, 29 November to 1 December 2017

Agenda Item 4: State A-CDM Updates

EVOLUTION OF AIRPORT COLLABORATIVE DECISION MAKING IN INDIA

(Presented by India)

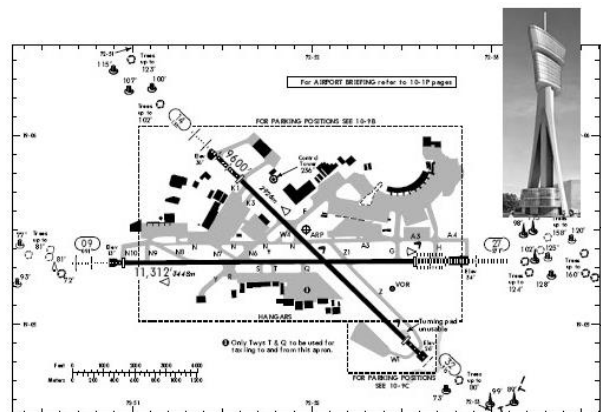
SUMMARY

This paper presents an overview of Collaborative Decision Making Platform developed by Airports Authority of India and the experience in implementation of the same for Chhatrapati Shivaji International Airport, Mumbai.

1. INTRODUCTION

ICAO Code	VABB
ANSP	Airports Authority of India
Operator	Mumbai International Airport (Pvt) Ltd.
No. of Runways	2 (crossing)
No. of movements	~320,000 per annum
No. of Passengers	~45.2 Million per annum

C.S.I. Airport, Mumbai is second busiest airport in India in terms of air traffic movements. On a typical day close to 920 flights and more than 123,000 passengers arrive and depart.



1.1 Airport collaborative decision making (A-CDM) is a process that serves as a tangible solution for the problem of congestion at airports. A-CDM is an operational paradigm where the decisions are based on shared and real-time information among the main stakeholders of an airport. A-CDM emphasizes the need for collaboration among the ANSP, airport operator, airlines and the ground handlers to improve upon the decision-making process to support economical and efficient operations as well as future growth planned by airports and airlines.

1.2 Airports Authority of India took initiative in 2013 for establishing A-CDM for stakeholders of Chhatrapati Shivaji International Airport (CSIA) which is one of the busiest single runway operations airports in the world. The first phase of the A-CDM operations was launched on December 10, 2015 with details in AIP supplement 82/2015. Since then it has become one of the essential tools in achieving smooth and efficient operations for CSIA Mumbai. This paper discusses the implementation details of the A-CDM system at CSIA Mumbai and on-going efforts in paving way for implementation of A-CDM System at other airports in India.

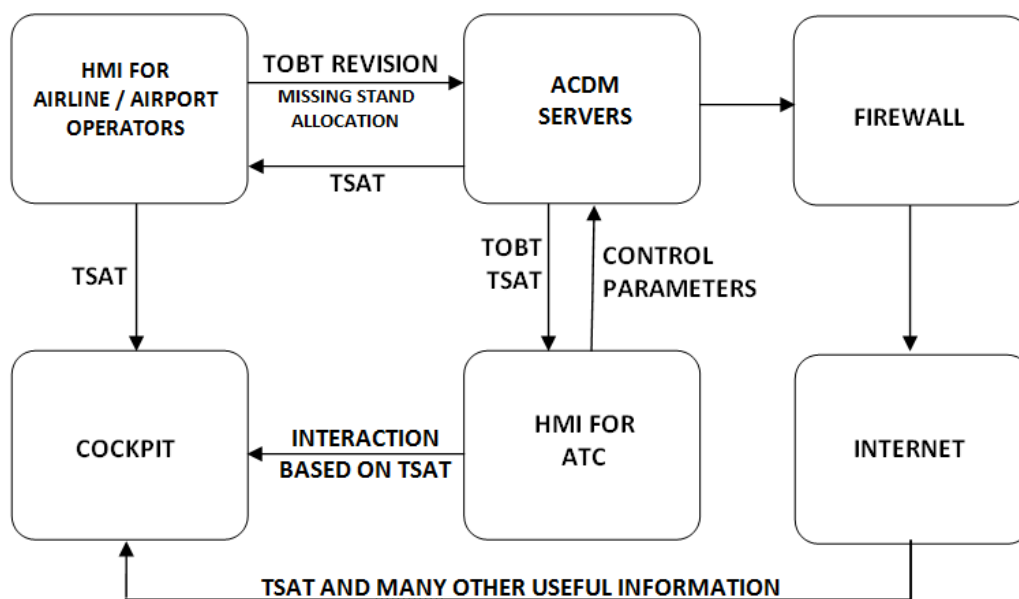
2. DISCUSSION

Salient Features of Mumbai A-CDM System

2.1 The Mumbai ACDM Project is an in-house initiative by ATC officers at Mumbai airport. All the major stakeholders like ANSP, Airport operator, Airlines, and Ground Handling agencies have been involved in every stage of development and design of the system. It is evolving into a robust system that benefits all the stakeholders.

2.2 Salient features of the project are:

- a. Automatic calculation of TSAT (Target Start up Approval Time).
- b. Flight Data processing, independent of ATC Automation System (AT3).
- c. Real time information sharing among stakeholders (Airport operator, Aircraft operators, Ground Handlers, ATC) through dedicated customized application HMI.
- d. Real time information sharing among stakeholders and other users, through ACDM website.
- e. NOTAM Application: All India NOTAMs processed automatically.



Objectives

2.3 The Airport-CDM system works on the concept of calculating target start-up approval time (TSAT). Departures starting up at TSAT, will reach holding position in optimized timings so as to depart without causing congestion at the holding position. This system calculates TSAT automatically through a complex algorithm, which takes into account the runway handling capacity, arrival congestion, runway closures, dynamic TOBT and variable taxi times.

Data Sources

2.4 This system interactively works on the input from following data sources:

- a. Aeronautical Fixed Telecommunication Network (AFTN) flight plan messages.
- b. Parking Stand and Registration Marking from airport operations database (AODB).

- c. Flight movement data from automation system.
- d. TOBT revisions from airline operators and ground handlers.
- e. Parking Stand revision from airport operator.

Output

2.5 System is capable of processing and updating data every three seconds.

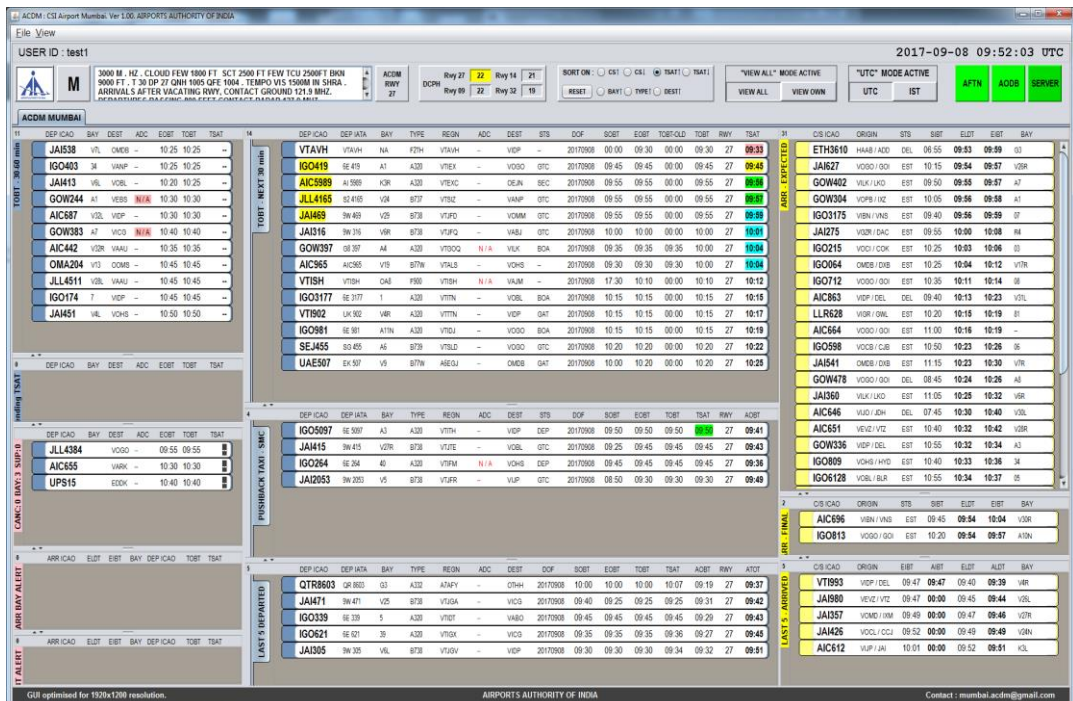
2.6 Relevant information to airline operators/ airport operator is displayed through a specifically developed interactive HMI.

- a. For departures: Color coded TSAT, TOBT, AOBT, ATOT and alerts are displayed.
- b. For arrivals: estimated landing time (ELDT), estimated in-block time (EIBT), actual landing time (ALDT), arrivals on final, bay alert etc. are displayed.

2.7 Processed data is displayed to ATC users through specifically designed HMI, which has control features like runway handling capacity, runway-in-use, runway closure, and slot control in addition to flights display.

2.8 All aviation stakeholders are provided with processed data through a dedicated website. The web interface provides TSAT, air defense clearance, movement charts, current NOTAMs, TOBT and bay alerts, automatic terminal information services (ATIS) for 46 airports and updated arrival information.

2.9 System maintains record of relevant flight movement information for future reference and analysis.



AIRLINE OPERATORS' HMI

Milestones in the Journey So Far

- 2.10 Deciding the rules, unanimously acceptable to all the stakeholders, on which the functionality of the A-CDM system will depend.
- 2.11 Technical Milestones:
- a. Sharing of required live data streams and feed monitoring
 - b. Integrating the data received from multiple live feed
 - c. Database design and Database Server management
 - d. System design and Software Coding
 - e. Application and Web Servers' design and security
 - f. Network design, setup and security
- 2.12 Regular awareness and coordination meetings with a committee of Nodal Officers from stakeholders.
- 2.13 Internal Trials for testing Software Integrity.
- 2.14 Live Trials with all stakeholders.
- 2.15 Training of stakeholders' executive staff.

Challenges

- 2.16 Convincing the stakeholders to accept the system and its rules. E.g. some of the operators have shown displeasure on holding them on the bay to consume delay till TSAT, as OTP is based on chocks-off time.
- 2.17 Apprehension of the Airline Operators, whether the system will be transparent.
- 2.18 Apprehension of the Airline Operators on sharing commercial information.
- 2.19 Apprehension of the Air Traffic Controllers on correctness of input data.
- 2.20 Educating stakeholders' personnel, especially pilots.

Solutions

- 2.21 Regular interaction with and training for ACDM in stakeholders' organization.
- 2.22 System is made transparent by allowing viewing rights on entire flight data to all stakeholders.
- 2.23 Information displayed is to the satisfaction of all stakeholders. Sensitive commercial information is not displayed.
- 2.24 Authorization to input data to the ACDM system is provided to trained manpower only.
- 2.25 AIP supplement, with details on the subject and system, has been issued and educative material has been circulated for pilots.

Benefits of A-CDM at Mumbai

2.26 Implementation of ACDM has significantly reduced the delays at holding point resulting in considerable fuel saving and reduced carbon emission in the environment. One of the studies has indicated that the cumulative daily fuel saving is about 2835 minutes (approx. 47 hours) of Code-‘C’ aircraft on ground. For this study Code-‘C’ aircraft were considered as 85% of aircraft operations at Mumbai airport are of this category.

2.27 This taxi-time saving has resulted into significant reduction in fuel consumption and carbon emissions:

- A Code-‘C’ aircraft consumes approximately 12 Kg fuel per minute during taxi with frequent breaking action. This 2835 minutes of daily taxi-time amounts to $2835 \times 12 \times 365 = 12417300$ Kg, i.e. 12417 Tonnes of annual fuel saving.
- This results in approximately 39487 Tonnes of lower CO₂ emissions per annum. ($12417300 \times 3.18 / 1000 = 39487$ Tonnes of CO₂).

Future Plans in India

2.28 Implementation activities are on at following airports to operationalize ACDM by March 31, 2018:

- a. Chennai International Airport, Chennai. Project is progressing as per timeline. Detailed Project Report has been finalized and approved by the competent authority. Hardware procurement is in progress. After procurement and installation, system will be available for trial.
- b. Netaji Subhash Chandra Bose International Airport, Kolkata. Project is progressing as per time line. Detailed Project Report has been finalized and submitted for approval by the competent authority. Hardware procurement will take place shortly.

2.29 ACDM implementation at other major airports will be taken up after Chennai and Kolkata.

Extending Help to Other ANSPs

2.30 CANSO has prepared an introductory Guide for ANSPs on ACDM implementation. The guide has included nine case studies as reference ACDM implementation models. Mumbai ACDM model is listed at No. 2 in the list of these case studies.

2.31 The in-house team of Airports Authority of India (AAI) is looking after implementation of ACDM at all the major airports in India. The team has taken up the implementation from planning stage through programming, development, testing, upgrading and maintenance. Due to its expertise in all the project phases, AAI can extend any kind of support for ACDM project.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) Note the progress made by AAI in developing A-CDM
- b) Note that AAI is ready to help other ANSPs, Airports in developing A-CDM systems.