International Civil Aviation Organization

The First Meeting of Air Traffic Management Automation System Task Force of APANPIRG (ATMASTF/1)

Web-conference, 28 – 30 October 2020

Agenda Item 5: Issues and Challenges in implementation

5.3 Integration with ATFM, CDM and A-SMGCS capabilities

CHALLENGES IN THE IMPLEMENTATION OF DMAN

(Presented by Singapore)

SUMMARY

This paper shares Singapore's experience and perspective gained from the implementation of Departure Manager (DMAN). The paper highlights the inter-dependencies between A-CDM and DMAN and stress the importance of collaboration and data accuracy for DMAN to deliver the expected benefits.

1. INTRODUCTION

1.1 Airport operations requires close collaboration between stakeholders in order to maximize resources and achieve efficiency in operations. A-CDM is a proven concept which optimises airport operations by creating an efficient turnaround process and improving the predictability of operational events. It helps to improve gate management, flight punctuality, reduce apron taxiway and holding point congestion which is beneficial to all airport partners[1]. This is achieved by sharing of accurate and timely information amongst airport partners by means of a common toolset and application of pre-defined processes and procedures.

1.2 Departure Manager (DMAN) is a planning system which aims to improve departure sequencing/flows at airports by calculating the Target Take-Off Time (TTOT) and Target Start-Up Approval Time (TSAT). DMAN considers factors such as variable taxi times, runway separation, wake turbulence category, SID and take-off time restrictions to determine the optimal departure sequence. The benefits of DMAN include optimal departure sequence to increase runway throughput, better ATFM slot compliance and better traffic regulation to runway to reduce runway queuing time.

1 Airport partners consists of but not limited to: Airport Operators, Airline Operators, Ground Handlers, Air Traffic Control and Air Traffic Flow Management Unit.

2. DMAN IMPLEMENTATION WITH A-CDM

2.1 With the introduction of A-CDM at Singapore Changi Airport since October 2016, a new set of planning times would be used to manage the pre-departure processes. One of them is the Target Off-Block Time[2] (TOBT) which Changi Airport considers it as the essence of A-CDM. Substantial number of processes and benefits in the turnaround and outbound phases would be linked to TOBT.

2.2 Below shows an overview of the A-CDM systems framework at Changi Airport.

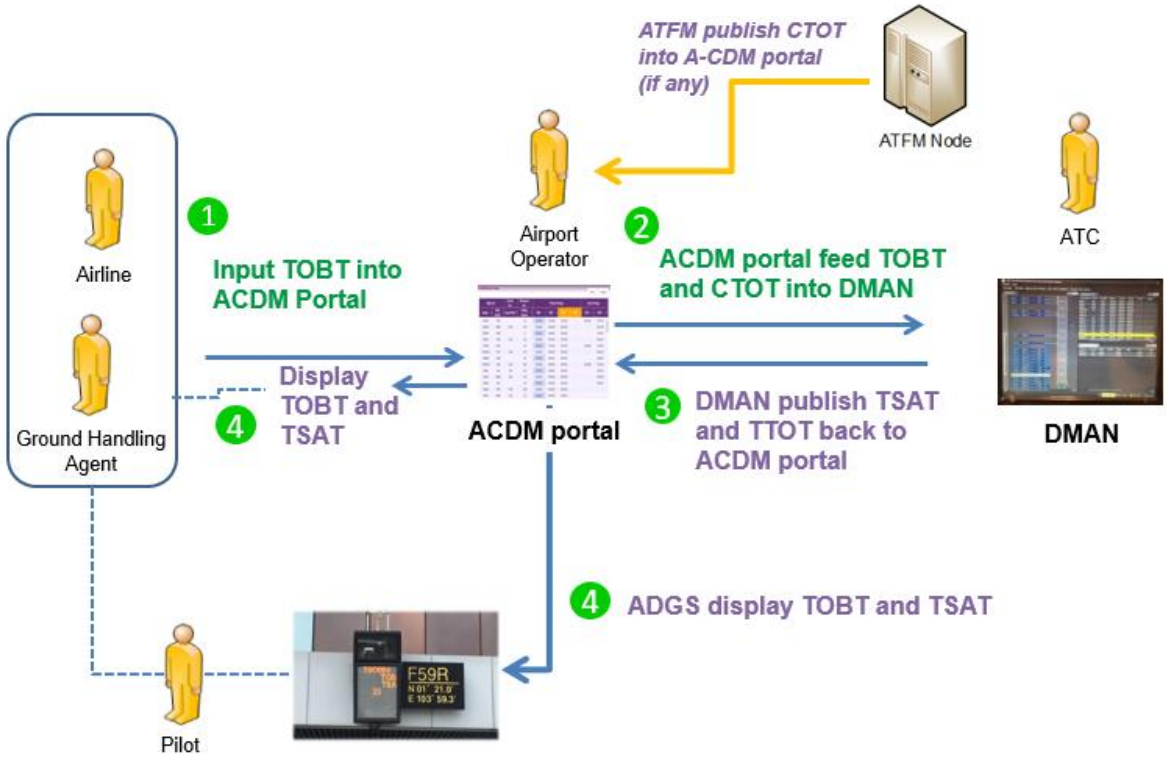

Diagram 1: Singapore Changi Airport A-CDM Systems Framework

2.3 A-CDM and DMAN are closely inter-linked and have high dependencies on one another. DMAN is a key system to support the implementation of A-CDM, and it uses the information shared through A-CDM to work effectively. DMAN requires the TOBT inputs from airlines or ground handling agents to calculate TTOT and TSAT. Depending on local airport A-CDM procedures, TOBT is typically provided at 40mins before depart time and constantly updated if there are changes of more than 5mins.

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2 Target Off-Block Time (TOBT) is time that an Aircraft Operator (AO) or Ground Handler (GH) estimates that an aircraft will be ready, all doors closed, boarding bridge removed, push back vehicle available and ready to start up/push back immediately upon reception of clearance from the tower. A-CDM systems can predict the initial TOBT through automated tracking of flight events that occur prior to landing and during the turnaround process. As system predictions does not take into account real-time operational situations, AO or GH are still required to provide manual TOBT updates when it differs by +/- 5mins.

2.4 Diagram 2 illustrates the DMAN sequencing process which shows how TOBT is used to derive TSAT and TTOT.

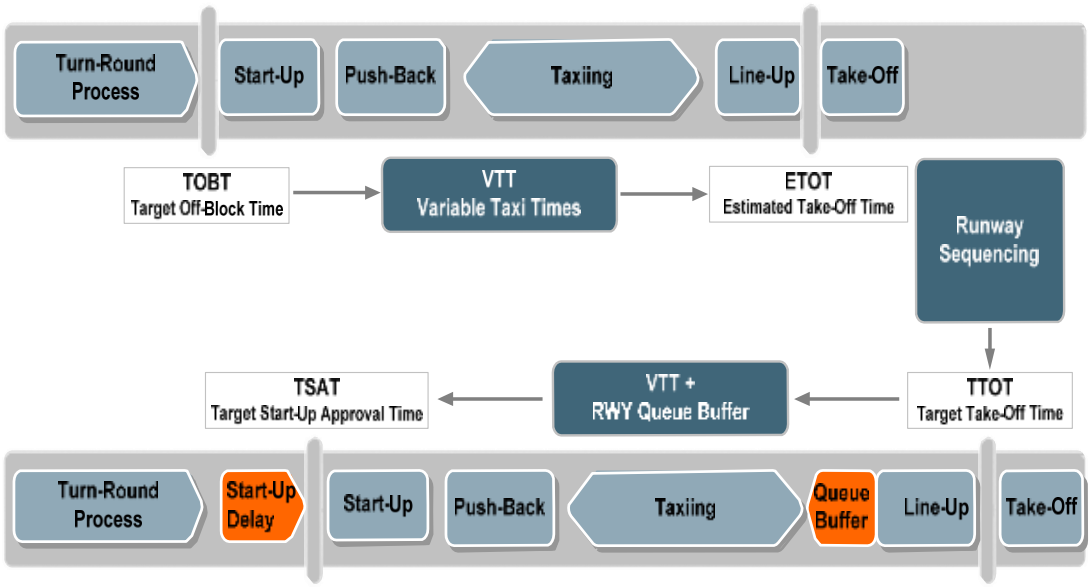

Diagram 2: DMAN sequencing process

2.5 As seen in the above departure sequencing process, inaccurate TOBT means inaccurate TTOT and would lead to inefficiencies in utilisation of runway capacity. Inaccurate TOBT also means inaccurate TSAT and would lead to more confusion rather than improving operational predictability and reduction in runway queuing time. For these reasons, the compliance of related procedures to ensure TOBT accuracy is important to achieve a successful and sustainable use of DMAN system. Poor TOBT accuracy would eventually cripple the operational use of DMAN and investments in automation will be wasted.

2.6 The success of DMAN implementation does not solely depend on the system itself. It is much more complex than Arrival Manager (AMAN) implementation, where automation alone can probably achieve the desired results. For DMAN to work, it requires a reasonable level of TOBT accuracy, and this can only be achieved if stakeholders act in the spirit of collaboration and commit to adhering to the agreed A-CDM processes and procedures.

2.7 There is no 'one-size-fits-all' solution for A-CDM and DMAN implementation. Regardless of the solutions, training will play a critical role in achieving the commitment of operational staff to adhere to the A-CDM processes and procedures for DMAN to work. Getting operational staff to understand the A-CDM concept and the impact of poor TOBT accuracy will also allow them to better appreciate how their individual action can contribute to system level benefits.

3 MOVING FORWARD

3.1 Singapore will be integrating our DMAN system with ATMS and AMAN, also known as Integrated AMAN DMAN (IAD), in 2021. This will create an even more automated environment where both arrival information and departure information are shared across. For example, if both the system working independently, controllers would have to manually put a fixed placeholder slot in DMAN for arrival flights in a departure runway. This is so that TTOT calculation will take into

consideration of the arrival and thus impact the TSAT where necessary. With the two systems integrated, this process is done automatically with information sharing.

3.2 IAD will also be brought one step forward towards even better automation by integrating Surface Manager (SMAN). Current TTOT calculation uses a fixed table of time coded into DMAN for taxi duration. The predicted duration of the taxi time may not be accurate if the aircraft is delayed due to traffic and other reasons. But with an SMAN integrated, a dynamic taxi time can be derived using ground sensors to determine speed and controllers' set taxi route to re-compute the taxi distance, thereby providing a real time adjustment of taxi duration time.

4 ACTION BY THE MEETING

4.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matter as appropriate

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