

**ICAO**Fifth Meeting of the Asia/Pacific Airport Collaborative Decision  
Making Task Force (APA-CDM/TF/5)*Video Conferencing, 15 to 17 June 2020***Agenda Item 5: Integration of A-CDM with ATFM****PLANNED A-CDM AND ATFM INTEGRATION FOR AUSTRALIA**

(Presented by Australia)

**SUMMARY**

This paper presents the proposed concept for A-CDM and ATFM integration in Australia.

**1. INTRODUCTION**

1.1 The Australian ATM Network comprises of a single state with operations managed by Airservices Australia. The airspace assigned by ICAO to Australia covers 11% of the earth's surface. Despite its large airspace, the Australian ATM Network has a unique characteristic in that a relatively high proportion of air traffic occurs between just three major airports on The East Coast within a relatively short flying time: at Sydney (YSSY), Melbourne (YMML), Brisbane (YBBN). Approximately 30% of the flights from these three airports depart to the other two. On the West Coast, Perth (YPPH) sees concentrated waves of high departure demand in the early morning for Fly-in-fly-out operations to remote mining sites, which upon return mix with peak domestic regular public transport services.

1.2 Demand and capacity challenges in the Australian ATM Network generally originate from capacity reductions at any of the above mentioned four major airports, which in case of the East Coast, can quickly propagate to any of the other ports.

1.3 Australia will be therefore be implementing A-CDM at Sydney (YSSY), Melbourne (YMML), Brisbane (YBBN) and Perth (YPPH) as a Partnership between Airservices (ANSP), Australia's four major domestic airline groups and the respective four airport corporations, with the ANSP (Airservices) as the lead organisation. The aim of the partnership is to reduce cost and complexity of the A-CDM implementation by ensuring a single technology solution and consistent A-CDM procedures across the country. Further, as a partnership, buy-in to the A-CDM concept by the main stakeholders is ensured from the very start, and implementation across multiple airports raises the benefits of A-CDM from an individual airport level to an ATM Network perspective.

1.4 Due to the downturn in air traffic as a result of COVID-19, Australia's A-CDM implementation program is currently on hold with the implementation schedule under review by the Partners (implementation was planned to commence second half of 2020).

## 2. DISCUSSION

2.1 Australia has a mature implementation of Collaborative Decision Making (CDM) between ATC and the major domestic airlines to mitigate the impact of disruptions across the Australian ATM Network through the use of Air Traffic Flow Management (ATFM) – in particular Ground Delay Programs (GDPs) – managed by the Network Coordination Centre (NCC) in Canberra.

2.2 The implementation of A-CDM needs to complement the existing CDM processes, and prevent significant complexity from requiring aircraft operators to comply with departure constraints provided by an A-CDM implementation at the departure airport (through assigning a Target Start-up Approval Time (TSAT), with arrival constraints for ATFM at the destination airport (through a Calculated Take-off Time (CTOT)).

2.3 To realise maximum benefits of A-CDM within the context of the entire ATM Network, the integration of A-CDM and ATFM in Australia has been considered both from a technical and CDM process perspective.

### Collaborative Management of Flight Updates

2.4 Collaborative Management of Flight Updates is one of the EUROCONTROL A-CDM Concept Elements; within the Australian context it is implemented in three ways.

2.5 First, slot allocation logic between A-CDM and ATFM has been coupled through the following main principles:

1. Arrival ATFM slot is nominally of higher priority than A-CDM Pre-Departure Sequence (PDS) slot.
2. PDS at the departure port is a *dynamic sequence* (order) rather than fixed slot allocation (times).
3. A change in ATFM arrival slot at the arrival port (CLDT/CTOT) automatically results in a nominally compliant PDS 'slot' at the departure port (TTOT & TSAT)

2.6 Principle 1 states that within the overall ATM Network, nominally, arrival constraints are of higher importance than departure constraints, i.e. nominally delays should be incurred on the ground rather than in the air. Practically, this means that within the A-CDM PDS, priority is assigned to flights with a CTOT assigning a TSAT that ensures an ATFM-compliant departure (refer to paragraphs 2.17-2.19 on PDS equity).

2.7 Principle 2 states that the PDS is more tactical tool than an ATFM slot manager; the PDS needs to respond to operator changes in Target Off Block Time (TOBT) close to departure. Rather than assigning fixed time slots (like an ATFM slot manager), focus should therefore be on delivering the right pushback *sequence*.

2.8 Principle 3 states that ATFM slot changes performed by CDM stakeholders are automatically sent to the PDS and actioned; i.e. a change of CLDT/CTOT in ATFM system results in automatic re-assignment of TSAT aiming for ATFM compliance. On the other hand, a (significant) change to TOBT (and potentially TSAT) in the A-CDM system does not result in an automatic ATFM slot re-assignment. The A-CDM system will show an alert that based on the TOBT update by the operator, a new TSAT was assigned that will result in departure time non-compliant with the assigned ATFM slot. Manual action is required in line with pre-existing CDM processes where an operator is required to apply for a new ATFM slot, if the original slot cannot be operated to.

2.9 Second, real-time arrival time updates are being sent from the ATFM system to the A-CDM system to provide an accurate estimate of arrival time at the destination airport, taking into account operator supplied schedule, ATFM slots, and tactical in-flight updates.

2.10 Third, Departure Planning Information (DPI) is being send from A-CDM to ATFM. DPI messaging in the Australian context is the sending of updated estimated Target Take-Off Times (TTOTs) and TOBTs from the A-CDM PDS to the centralised ATFM system:

- TTOTs send by the A-CDM system update the departure time estimate in the ATFM system to update the demand prediction across the network for both airport and airspace resources.
- TOBTs send by the A-CDM system can set Earliest Off-Block Times (ELOBT) in the ATFM system to ensure that upon a GDP activation or revision, flights will not get assigned an unachievable ATFM slot.

2.11 DPI messages will be send from A-CDM Milestone 5 ‘Final Approach’ (referred to as ‘Sequenced in AMAN’ in Australian implementation). From this Milestone, the flight is locked in the arrival sequence for landing, ensuring an accurate Estimated Landing Time (ELDT), Estimated In-Blocks Time (EIBT) and therefore TOBT and TTOT (the latter two send as part of a DPI message to the ATFM system).

2.12 The combination of departure (DPI) and arrival time updates allow to estimate the propagation of network delay. E.g. a flight on arrival into Melbourne triggers a DPI for its next leg to Sydney. The ATFM system subsequently updates the departure time to Sydney, as well as the arrival time in Sydney. This updated arrival time in the ATFM system for Sydney is send to the Sydney A-CDM implementation and triggers an automatic (preliminary) TOBT update for the following leg to Brisbane.

2.13 The proposed integration of the multiple A-CDM systems with the centralised ATFM system provides improved projection of arrival and departure demand throughout the network, especially the closely connected ports on the East Coast. Aircraft operators benefit from predictability for the next two or more legs of an airframe as it performs multiple back-and-forth sectors on the East Coast per day. It also provides the NCC with an early warning of network delay propagation, allowing early action to be coordinated with the CDM stakeholders.

#### Network Collaborative Decision Making

2.14 Current CDM is predominately focussed at managing arrival demand through adjusting airport arrival acceptance rates and associated GDP revisions. The impact of departure demand is often not adequately considered. For example, when recovering from adverse events, often large departure delays occur as arrival demand has been prioritised. Departure delays subsequently impact on the arrival flows at the destination airport. In some cases, the tactical arrival rate is lowered in order to clear (some of the) departure queue, which increases airborne delays. The impact of an adverse event at one airport, may therefore ripple unpredictably throughout the network and lengthen the time it takes for all stakeholders to recover.

2.15 A-CDM provides improved visibility of real-time arrival and departure demand throughout the network (refer to paragraphs 2.4-2.13 on information flows). Collaborative decision making will be able to include considerations of arrival and departure balancing, to ensure a smoother recovery from an adverse event, and mitigate the impact on the remainder of the network.

2.16 Integrating A-CDM into network management, will bring benefits by improving the accuracy of flight information, as well as enabling a more collaborative approach to traffic management at a network level.

#### Equity in A-CDM Pre-Departure Sequence

2.17 As stated in the introduction of this paper, a relative high proportion of departures from especially Sydney (YSSY), Melbourne (YMML), Brisbane (YBBN) departs to the other two. This

means that when GDPs are active at any of these ports, the PDS at the departure port may have a high proportion of flights with a CTOT that will be automatically prioritised (to ensure ATFM compliance). As a result, during times of high departure demand (or times of low departure capacity), inequitable TSAT delay distribution may occur where flights without a CTOT receive more delay.

2.18 To ensure delay distribution within the PDS is as equitable as possible, the PDS is uses the CTOT compliance window (when required) to ensure that flights departing within vicinity of one another, are allocated balanced TSAT delays.

2.19 Further, as part of the Network CDM concept, CTOT compliance from a certain departure airport may be suspended if it has been determined that departure capacity at that airport is the limiting factor on of the ATM Network. For example, if strong crosswinds at Sydney (YSSY) dictate the use of a single runway only (less than 50% of normal capacity), Sydney (YSSY) capacity becomes the limiting factor of the ATM Network; CTOT compliance for flights departing Sydney (YSSY) may subsequently be suspended to ensure the PDS can deliver the most optimal pushback sequence given the limited available capacity.

### **3. ACTION BY THE MEETING**

3.1 The meeting is invited to note the information contained in this paper.

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