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AIRPORTS AUTHORITY OF INDIA

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## **AIRPORT COLLABORATIVE DECISION MAKING (A-CDM)** **KEMPEGOWDA INTERNATIONAL AIRPORT, BENGALURU (VOBL)**

### **1. INTRODUCTION**

- 1.1 Airport Collaborative Decision Making (A-CDM) enhances efficiency, predictability, and sustainability of airport operations by promoting timely information sharing and coordinated decision-making among A-CDM stakeholders. A-CDM enables decisions based on accurate and timely shared situational awareness primarily amongst Aircraft Operators, Ground Handling Agencies (GHA), Airport Operator, Air Navigation Service Provider (ANSP) and Air Traffic Flow Management Unit (ATFMU).
- 1.2 A-CDM supports efficient planning and execution of airport activities, leading to reduced taxi times, lower fuel consumption and decreased emissions.
- 1.3 The guiding principles for A-CDM are available in ICAO DOC 9971(Manual Of CATFM) and 'Asia Pacific Airport Collaborative Decision-Making Implementation Plan'.

### **2. APPLICABILITY**

- 2.1 A-CDM procedures are applicable to all stakeholders involved in aircraft operations at Kempegowda International Airport Bengaluru (KIAB), operating under the A-CDM framework.

- 2.2 A-CDM procedures shall be applicable H24 to all the flights operating at KIAB, unless otherwise notified.
- 2.3 Medical Emergency, VVIP, Military and Search and Rescue flights will be exempted from A-CDM procedures.
- 2.4 Due to tactical requirements and to make best use of available slots, Air Traffic Control (ATC) may alter sequence.

### 3. KEY PARAMETERS OF A-CDM

#### 3.1 TARGET OFF-BLOCK TIME (TOBT)

3.1.1 Definition: The time that an Aircraft Operator 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 ATC. It is the real time target of ensuring readiness of an aircraft and therefore more accurate than the static departure time mentioned in the flight plan and hence an ideal milestone to be used by all stakeholders.

3.1.2 TOBT must be updated to an accuracy of  $\pm 5$  minutes.

3.1.3 Target Off-Block Time revision:

Action by Airline / Aircraft Operator / Ground Handling Agency (GHA):

| S. No. | Scenario                                                                                                            | Input in User Interface                                                                        | AFTN Message Generation | TOBT                                            | Remarks                                                                                                                                                                 |
|--------|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | No Change anticipated in EOBT.                                                                                      | NIL                                                                                            | NIL                     | TOBT= EOBT                                      | When no change to the filed EOBT is anticipated, no action is required by Aircraft operator and the filed EOBT will be treated as TOBT.                                 |
| 2      | Aircraft Operator anticipates delay in Off-Block of departing aircraft, by 15 minutes or less, w. r. t. filed EOBT. | The Aircraft Operator shall update the TOBT in the Interface provided by the Airport Operator. | NIL                     | TOBT=EOBT+ Anticipated Delay (up to 15 minutes) | Where the TOBT is later than the filed EOBT by not more than 15 minutes, the Aircraft Operator shall update the TOBT in the Interface provided by the Airport Operator. |

|   |                                                                                                                       |     |                                                        |                                           |                                                                                                                                              |
|---|-----------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 3 | Aircraft Operator anticipates delay in Off-Block of departing aircraft, by more than 15 minutes, w. r. t. filed EOBT. | NIL | DLA/CHG message by Aircraft Operator                   | TOBT= Revised EOBT as per DLA/CHG message | Aircraft Operator shall comply with the ATS Flight planning requirements contained in AIP/e-AIP India ENR 1.9 and ENR 1.10.                  |
| 4 | Aircraft Operator anticipates early departure of flight by more than 15 Min w. r. t. filed EOBT                       | NIL | CNL message & new FPL to be filed by Aircraft Operator | TOBT=EOBT in new FPL                      | Aircraft Operator shall cancel the existing flight plan and submit a new flight plan in accordance with AIP/e-AIP India ENR 1.9 and ENR1.10. |

3.1.4 Delays at departure aerodrome may take place due to demand-supply imbalance in departure slots (TSAT) or C-ATFM measures (CTOT). In such cases the aircraft operator need not file a message for delay.

3.1.5 A term “*Preliminary Off-Block Time*” (POBT), for a departure, which is calculated by adding Minimum Turn-around Time (MTTT) to EIBT of corresponding arriving aircraft, is also used in arriving at an optimal TOBT value.

3.1.6 If POBT of a departure is greater than TOBT, then POBT will be used for calculation of TSAT.

3.1.7 Compliance of Air Defense Clearance (ADC) needs to be ensured by aircraft operator.

## 3.2 TARGET START UP APPROVAL TIME (TSAT)

3.2.1 Definition: Time at which the aircraft can expect start-up or pushback approval. A-CDM application calculates this time taking into account TOBT, CTOT, prevailing handling capacity and traffic situation.

**Note:** In case there is no congestion, ATC may allow the aircraft to push-back/start-up even before the TSAT.

**Calculation of TSAT:** TSAT is calculated automatically by A-CDM Application. The TSAT is calculated by taking into account TOBT/POBT, priority of aircraft, variable taxi times, and the runway’s departure handling capacity. Any revision in EOBT/TOBT will trigger the A-CDM application to recalculate a new TSAT for that flight as well as

to re-allocate earlier TSAT to another flight which meets the requisite conditions. TSAT is displayed in various A-CDM interfaces in the following color-coded information.

- a) Blue Color: TSAT -15 minutes up to TSAT -5 minutes
- b) Green Color: TSAT -5 minutes up to TSAT +5 minutes
- c) Red Color: After TSAT >5 minutes.

\* **Note:** Any change in the assigned aircraft parking bay or gate will result in a corresponding revision of the TSAT and TTOT.

\***Note:** In case of reduction in declared Runway Capacity due any unforeseen reason, ACDM system will generate revised TSAT & TTOT

3.2.2 Generation of TSAT: TSAT is generated by A-CDM platform 40 minutes prior to TOBT.

3.2.3 Communication of TSAT: TSAT will be displayed in various A-CDM interfaces, Airport Operational System (AOS) and airside displays provided by airport operator. In case TSAT is not available to flight crew through a display, concerned Aircraft Operator / GHA shall advise flight crew of TSAT.

3.2.4 Airport operator, Aircraft operators and GHAs are required to monitor the A-CDM interface regularly to get information on the revised TSAT if any, in respect of their aircraft. It may be noted that the earlier allocated TSAT may get changed due to the following reasons:

- i) Change of runway
- ii) Change in taxi times
- iii) Revised TOBT of the subject aircraft
- iv) Cancellation/ revision in TOBT of other aircraft in the departure sequence
- v) Priority handling and other Unusual Occurrences
- vi) Application of ATFM regulation or ATC restriction resulting in new CTOT or start up delay
- vii) Inclement Weather resulting in change of handling capacity.

3.2.5 Validity: The TSAT will be valid for +/- 5 minutes.

### 3.3 **Additional Parameters: AH-Max and BT-Min**

At KIAB, additional optimization measures are applied for parallel runway operations using parameters defined below:

3.3.1 AH-Max (Acceptable Holding – Maximum Value) It represents a value of holding period in minutes, acceptable to departures, for the preferred runway. At KIAB, AH-Max value is 05 minutes.

3.3.2 BT-Min (Benefit in TTOT – Minimum Value) It represents a value of expected benefit in TTOT in case the departure is sequenced on alternate runway. At KIAB, BT-MIN value is 05 minutes.

3.3.3 Runway reassignment is undertaken only when the operational benefit exceeds the defined threshold, ensuring efficient utilization without unnecessary disruption. This logic shall be enabled in the A-CDM interface by ATC, subject to prevailing operational constraints.

#### **4. Coordination with Air Traffic Flow Management Unit (ATFMU)**

4.1 A fully automatic data exchange with ATFMU is established. A-CDM system is receiving ELDT and CTOT from ATFMU (C-ATFM).

4.2 The data sent from A-CDM to C-ATFM enables efficient CTOT calculations.

4.3 CTOT will be considered as TTOT for calculation of TSAT.

4.4 CTOT issued by BOBCAT and received through WSO, shall be updated by AOCC in ACDM System. TSAT will be generated accordingly.

#### **5. A-CDM Start-up / Push-back procedures**

5.1 Pre-Departure Sequence: Pre-Departure sequence is the order in which the ATC plans the aircraft to depart from their Gate/Stand. It should not be confused with the Pre-Take-off sequence where ATC decides on the order in which the aircraft at holding points of the runway will depart.

5.2 Start-Up and Push-Back Procedure:

- i) The aircraft must be ready for Start-up/Push-back at TOBT. Any revisions in TOBT shall be updated by the aircraft operator at the earliest.
- ii) The Pilot will contact Clearance Delivery (CLD) and request for Pre-Departure Clearance between TSAT (-15) minutes to TSAT (-5) minutes. (Blue Zone)
- iii) Pilot shall contact SMC (GROUND) for Start-up/Push-back between TSAT (-5) minutes and TSAT + 5 minutes (Green Zone), subject to change over from CLD.

Note: Subject to slot availability, the system may revise the TSAT up to the TOBT in order to maintain the closest possible alignment with the TOBT.

- iv) ATC should normally be able to issue push-back/start-up within TSAT validity period (green Zone). Pilots will be informed by ATC if there is a delay
- v) If ATC has not received Pushback/Start up request within the green zone, the aircraft will lose its position in sequence. In such cases:
  - a) Aircraft Operator shall update TOBT in line with the procedure mentioned for TOBT update
  - b) A revised TSAT will be issued because of resequencing done based on new TOBT.
- vi) Taxi clearance shall be requested from ATC within seven (7) minutes of the push-back/start-up approval time. If the aircraft is unable to comply, pilot shall notify SMC (GROUND) of the extent of delay. In such cases, aircraft may lose its departure slot.
- vii) The Pre-Departure (Off- block) Sequence will be determined in accordance with Target Start up Approval Time (TSAT) and NOT in accordance with the Start-up Request. Pre-Departure Sequence will not have any bearing on Actual Departure sequence.

(Note: Actual Departure sequence may differ from pre-departure sequence in order to optimize the Runway and Airspace utilization.)

## **6. A-CDM ALERTS**

- 6.1 A-CDM alerts will be generated by A-CDM platform to indicate any missing or inconsistent data affecting the A-CDM process.
- 6.2 Aircraft operators/airport operator/GHAs/ATC shall monitor and act on A-CDM alerts within their respective areas of responsibility.
- 6.3 Unresolved alerts may result in non-issuance or revision of TSAT or may affect pre-departure sequencing.
- 6.4 Comprehensive description of alerts associated responsibilities and resolution procedures are contained in KIAB A-CDM manual and SOP.

## **7. ROLES AND RESPONSIBILITIES OF STAKEHOLDERS**

### **7.1 AIRCRAFT OPERATOR**

- 7.1.1 The Aircraft Operator shall provide the Flight Plan and associated updates, including DLA, CHG, and CNL messages. Where aircraft rotation changes occur due to operational reasons, including but not limited to technical defects, return taxi, aircraft

substitution, or other operational constraints, the relevant delay message shall be updated and transmitted in a timely manner.

7.1.2 Provide TOBT and updates.

7.1.3 Ensure the flight crew is aware of TOBT/TSAT/TTOT/CTOT and BOBCAT information.

7.1.4 Ensure that the flight crew is aware of and comply with ACDM procedures including CTOT Issued by BOBCAT and consequent revised TSAT

7.1.5 Update aircraft registration and type of aircraft in A-CDM/AOS interface.

## **7.2 AIRPORT OPERATOR**

7.2.1 Ensure serviceability of the system hardware and network to facilitate A-CDM operations

7.2.2 Facilitate A-CDM stakeholders with an interface to exchange relevant information

7.2.3 Provide flight schedule information and any changes therein to the A-CDM platform

7.2.4 Provide all information relevant to A-CDM, available in AODB/AOS system, to A-CDM platform;

7.2.5 Overall coordination of the A-CDM process during operations

7.2.6 Monitor adherence to the A-CDM procedures

7.2.7 Ensure that all stakeholders are trained regularly, in adequate numbers.

7.2.8 The Airport Operator shall ensure that aircraft parking stand planning is carried out based on the latest TOBT updated by the aircraft operator through the A-CDM/AOS interface, while considering applicable local stand restrictions and operational requirement

## **7.3 AIR NAVIGATION SERVICE PROVIDER (ANSP)**

7.3.1 Provide runway-in-use and planned runway-in-use.

7.3.2 Provide runway's departure handling capacity.

7.3.3 Ensure that start-up is issued in accordance with TSAT.

7.3.4 Update runway closure information.

7.3.5 Take necessary measures, in coordination with airport operator, during A-CDM system's non-availability and any other contingency.

- 7.3.6 To make best use of available slots or due to operational requirements Air Traffic Control (ATC) may alter sequence

#### **7.4 C-ATFM UNIT**

- 7.4.1 Provide access to KIAB A-CDM platform for effective data exchange
- 7.4.2 Enable receiving of relevant Departure Planning Information (DPI) messages from KIAB A-CDM platform
- 7.4.3 Shall provide relevant information (e.g. CTOT/ELDT) to KIAB A-CDM platform.

### **8. A-CDM CONTINGENCY AND FALLBACK PROCEDURES**

- 8.1 A-CDM Contingency and Fallback Procedures may be applied in the event of:
- i) Unavailability or degradation of A-CDM platform
  - ii) unreliable operational data; and
  - iii) non-availability / failure of data exchange.
- 8.2 During such periods information available in A-CDM platform may be unreliable or not available at all.
- 8.3 Conventional procedures shall be applicable for operations.
- 8.4 Stakeholders shall endeavor to provide relevant flight information through available means as far as practicable.
- 8.5 Application of A-CDM contingency measures and fallback procedures shall be communicated to stakeholders, by Airport Operator in coordination with ATC.
- 8.6 Detailed A-CDM contingency and fallback procedures including stakeholders' actions, communication arrangements and restoration procedures are contained in the KIAB A-CDM manual and KIAB A-CDM SOP.

### **9. OPERATIONAL INFORMATION DISSEMINATION**

Relevant information for stakeholders, available with A-CDM system, is disseminated through following means:

- i) Access controlled application interface provided to representatives of ANSP, Aircraft operators, Ground Handlers and Airport Operator.
- ii) AVDGS display boards and all-weather display boards on non AVDGS stands/Gates.

## 10. ABBREVIATIONS

All acronyms are the time parameters which have a standard length of four characters and have been arranged as per the sequence of aircraft movement.

| ABBREVIATION | FULL FORM                     | EXPLANATION                                                                                                                                        |
|--------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| ELDT         | Estimated Landing Time        | The estimated time that an aircraft is expected to touchdown on the runway.                                                                        |
| ALDT         | Actual Landing Time           | The time that an aircraft lands on a runway.                                                                                                       |
| EXIT         | Estimated Taxi-In Time        | The estimated taxi time between landing and in-Block.                                                                                              |
| AXIT         | Actual Taxi-In Time           | $AXIT = AIBT - ALDT$                                                                                                                               |
| SIBT         | Scheduled In- Block Time      | The time that an aircraft is scheduled to arrive at its parking position.                                                                          |
| EIBT         | Estimated In- Block Time      | The estimated time that an aircraft will arrive in-blocks.                                                                                         |
| AIBT         | Actual In- Block Time         | The time that an aircraft arrives in-blocks.                                                                                                       |
| STTT         | Scheduled Turnaround Time     | $STTT = SOBT - SIBT$                                                                                                                               |
| ETTT         | Estimated Turnaround Time     | The time estimated by the Aircraft Operator / GHA, on the day of operation to turnaround a flight taking into account the operational constraints. |
| MTTT         | Minimum Turnaround Time       | The minimum turnaround time agreed with an Aircraft Operator / GHA, for a specified flight or aircraft type.                                       |
| ATTT         | Actual Turnaround Time        | $ATTT = AOBT - AIBT$                                                                                                                               |
| ASRT         | Actual Start Up Request Time  | Time the pilot requests start up clearance.                                                                                                        |
| TSAT         | Target Start Up Approval Time | The time provided by ATC/Application taking into account TOBT,                                                                                     |

|      |                                  |                                                                                                                                                                                                                                             |
|------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                                  | CTOT* and/or the traffic situation that an Aircraft can expect start-up / push-back approval.<br>Note: The actual start up approval (ASAT) can be given in advance of TSAT.                                                                 |
| ASAT | Actual Start Up Approval Time    | Time when an aircraft receives its start-up approval.                                                                                                                                                                                       |
| SOBT | Scheduled Off- Block Time        | The time that an aircraft is scheduled to depart from its parking position.                                                                                                                                                                 |
| EOBT | Estimated Off- Block Time        | The estimated time at which the aircraft will start movement associated with departure.                                                                                                                                                     |
| TOBT | Target Off- Block Time           | The time that an Aircraft Operator 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 ATC. |
| POBT | Preliminary Off-Block Time       | It is calculated by adding Minimum Turn-around Time (MTTT) to EIBT of corresponding arriving aircraft.                                                                                                                                      |
| AOBT | Actual Off- Block Time           | Time the aircraft pushes back / vacates the parking position.                                                                                                                                                                               |
| ARDT | Actual Ready Time (for Movement) | When the aircraft is ready for start-up/push back or taxi immediately after clearance delivery, meeting the requirements set by the TOBT definition.                                                                                        |
| EXOT | Estimated Taxi-Out Time          | The estimated taxi time between off-block and take off. This estimate includes any delay buffer time at the holding point prior to take off.                                                                                                |

|      |                           |                                                                                                                                                                                                    |
|------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AXOT | Actual Taxi- Out Time     | $AXOT = ATOT - AOBT$                                                                                                                                                                               |
| ETOT | Estimated Take Off Time   | The estimated take-off time taking into account the EOBT plus EXOT.                                                                                                                                |
| CTOT | Calculated Take Off Time  | A time calculated and issued by the appropriate Central Management unit, as a result of tactical slot allocation, at which a flight is expected to become airborne.                                |
| TTOT | Target Take Off Time      | The Target Take Off Time taking into account the TOBT/TSAT plus the EXOT. Each TTOT on one runway is separated from other TTOT or TLDT to represent vortex and/or SID separation between Aircraft. |
| AOS  | Airport operations system | AODB and RMS systems                                                                                                                                                                               |
| ATOT | Actual Take Off Time      | The time that an aircraft takes off from the runway.                                                                                                                                               |