Zurich Airport

A-CDM OPS Manual at ZRH Airport

Version 1.3

Table of Content

1.	**History of Changes, References and Glossary**	**4**
1.1.	History of Changes	4
1.2.	References	4
1.3.	Glossary	4
2.	**Purpose of this Document**	**6**
3.	**Airport Collaborative Decision Making**	**7**
3.1.	What is A-CDM?	7
3.1.1.	Benefits of A-CDM	7
3.1.2.	ZRH partners and their support to the A-CDM adjustment	8
3.1.2.1.	Obligations to the Ground Handlers according “third-party handling authorization”	9
3.2.	The concept elements of A-CDM	9
3.3.	Data exchange with NMOC	10
3.3.1.	Flight Update Message	11
3.3.2.	Departure Planning Information	11
3.4.	Key A-CDM information/data at ZRH Airport	12
3.4.1.	TOBT – Target Off-Block Time	12
3.4.2.	ARDT – Actual Ready Time	13
3.4.3.	TSAT – Target Start-Up Approval Time	13
3.4.4.	TTOT – Target Take-off Time	14
3.4.5.	EOBT – Estimated Off-Block Time	14
3.4.6.	CTOT – Calculated Take-Off Time	14
3.5.	Processes and procedures of A-CDM at ZRH Airport	14
3.5.1.	Deviations between TOBT and EOBT	14
3.5.2.	Flight must be ready at TOBT +/- 5 minutes	15
3.5.3.	TSAT and effects of TOBT updates	15
3.5.4.	Departures with a CTOT	15
3.6.	A-CDM Terminology at ZRH Airport	15
4.	**The Milestone Approach at ZRH Airport**	**16**
4.1.	CDM Alerts	17
4.2.	Milestone 1 – ATC flight plan activated	19
4.2.1.	Implementation of Milestone 1 at ZRH Airport	20
4.3.	Milestone 2 – EOBT -2h	22
4.3.1.	Implementation of Milestone 2 at ZRH Airport	23
4.4.	Milestone 3 – Take-off from outstation	24
4.4.1.	Implementation of Milestone 3 at ZRH Airport	25
4.5.	Milestones 4 and 5 – Local radar update/Final approach	26
4.5.1.	Implementation of Milestone 4 at ZRH Airport	27
4.5.2.	Implementation of Milestone 5 at ZRH Airport	27
4.6.	Milestones 6, 7 and 8 – Landed/In-blocks/Ground Handling started	28
4.6.1.	Implementation of Milestone 6 at ZRH Airport	29
4.6.2.	Implementation of Milestone 7 at ZRH Airport	29
4.6.3.	Implementation of Milestone 8 at ZRH Airport	29
4.7.	Milestone 9 – TOBT confirmation prior to TSAT issue	30

4.7.1. Implementation of Milestone 9 at ZRH Airport 31
4.8. Milestone 10 – TSAT issued 32
4.8.1. Implementation of Milestone 10 at ZRH Airport 33
4.9. Milestone 11 – Boarding started 34
4.9.1. Implementation of Milestone 11 at ZRH Airport 35
4.10. Milestone 12 – Aircraft ready 36
4.10.1. Implementation of Milestone 12 at ZRH Airport 36
4.11. Milestone 13 – Start-up requested 38
4.11.1. Implementation of Milestone 13 at ZRH Airport 39
4.12. Milestone 14 – Start-up approved 40
4.12.1. Implementation of Milestone 14 at ZRH Airport 41
4.13. Milestone 15 – Off-block 42
4.13.1. Implementation of Milestone 15 at ZRH Airport 43
4.14. Milestone 16 – Take-off 44
4.14.1. Implementation of Milestone 16 at ZRH Airport 44
5. Adverse Conditions at ZRH Airport 45
5.1. De-icing 45
5.1.1. De-icing status 45
5.1.2. DPI Messages during de-icing conditions 46
5.1.3. Factors contributing to smooth de-icing operation 46
5.1.3.1. Flight Crew 46
5.1.3.2. Ground Handler/Aircraft Operator 46
5.1.3.3. De-icing Provider 46
5.1.3.4. De-icing Coordination 47
5.1.3.5. Apron Control 47
5.1.3.6. Clearance Delivery 47
5.2. Handling/Fueling Stop 47
6. TOBT Management at ZRH Airport 47
6.1. TOBT Management during normal OPS 47
6.1.1. Manual TOBT Management 47
6.1.2. Automatic TOBT Management 47
6.2. TOBT Management during Adverse Conditions 48
6.2.1. TOBT Management during/after interruption of OPS 48
6.2.2. TOBT Management during Winter OPS 48
6.2.3. TOBT Management/TSAT generation for flights with on-stand de-icing 48
7. Advice Time at ZRH Airport 48
8. REA message for regulated flights at ZRH Airport 49
9. Appendix 51
9.1. Graphic of the DPI Messages/CDM Milestones/CDM Alerts at ZRH Airport 51
9.2. Summary – A-CDM workflow and abbreviations 52

1. History of Changes, References and Glossary

1.1. History of Changes

Changes and Reviews				
Version	Status	Date of issue	Author	Details
1.0	Released	05.07.2013	A. Gammel / FZAG F. Brühwiler / FZAG	
1.1	Released	15.10.2013	F. Brühwiler / FZAG	
1.2	Released	10.12.2015	A. Gammel / FZAG F. Brühwiler / FZAG	
1.3	Released	30.04.2020	R. Schaffner / FZAG A. Gammel / FZAG F. Brühwiler / FZAG	Correction and adjustment of the whole document due to the alignment of the local procedure according to the EUROCONTROL standards and recommendations

1.2. References

Reference Documents		
Document	Author	Details
Airport CDM Implementation Manual	EUROCONTROL	Latest Version
DPI Implementation Manual	EUROCONTROL	Latest Version
Flight Progress Messages Document	EUROCONTROL	Latest Version

1.3. Glossary

AA	Airport Authority
A-CDM	Airport Collaborative Decision Making
ACZT	Actual Commencement of De-icing Time
AIMS	Airport Information Management System
AO	Aircraft Operator
AOBT	Actual Off-Block Time
AP	Airport Operator
APRON	Apron Control
ARDT	Aircraft Ready Time
ASAT	Actual Start-Up Approval Time
ASBT	Actual Start Boarding Time
ASRT	Actual Start-Up Request Time
ATC	Air Traffic Control
ATFM	Air Traffic Flow and Capacity Management
BA/GA	Business Aviation/General Aviation
BTT	Begin Taxi Time
CLD	Clearance Delivery

CLE	Clearance Time when Flight Crew reports Ready and CLD transfers flight to APRON => equal to ARDT
CTOT	Calculated Take-Off Time
Darts	Departure and Arrival Traffic Management System
DGS	Dock Guidance System
DMAN	Departure Manager (System)
DPI	Departure Planning Information Message
EIBT	Estimated In-Block Time
ELDT	Estimated Landing Time
EOBT	Estimated Off-Block Time from ICAO flight plan
ETD	Estimated Time of Departure according IATA
ETOT	Estimated Take-Off Time
EXIT	Estimated Taxi-In Time
EXOT	Estimated Taxi-Out Time
FPL	Filed Flight plan
FUM	Flight Update Message
GH	Ground Handler
MTTT	Minimum Turnaround Time
NMOC	Network Manager Operations Centre
PAD	Public Advice Time
PED	Public ETD
RDY	Aircraft Ready
REA	Ready Message
SAD	Staff Advice Time
SED	Staff ETD; internal for Staff only ETD => equal to TOBT
SID	Standard Instrument Departure
SOBT	Scheduled Off-Block Time
STD	Scheduled Time of Departure according IATA
TRACE/FDPZ	Tower-Approach Communication
TOBT	Target Off-Block Time
TSAT	Target Start-up Approval Time
TTOT	Target Take-Off Time
FDPS	Flight Data Processing System
VTT	Variable Taxi Time
FIDS	Flight Information Display System

2. Purpose of this Document

The purpose of this document is to provide basic information about the Airport Collaborative Decision Making (A-CDM) concept, such as the core elements of A-CDM and the Milestone Approach. In addition, the processes and procedures at ZRH Airport to fulfill the A-CDM standard are described in detail. All processes described have been elaborated and approved by an expert team consisting of Air Traffic Control, Ground Handler, Airlines and Zurich Airport.

This manual is to be understood and used by the various partners, such as Ground Handler and Airlines.

This A-CDM manual is part and parcel of the “third-party handling authorization” of Zurich Airport. To support and improve the sharing of relevant times and information of the turnaround processes coming from the aircraft handling activities.

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3. Airport Collaborative Decision Making

3.1. What is A-CDM?

A-CDM is a concept, which encourages Airport Operators (AP), Ground Handlers (GH), Aircraft Operators (AO), Air Traffic Control (ATC) and the Network Manager Operations Centre (NMOC) to work together more efficiently and more transparently by sharing relevant data in a most accurate and timely manner. This transparent cooperation between the various partners and the coordination of data allows the Air Traffic Flow and Capacity Management (ATFM) at airports as well as in the European airspace to be designed in a more demand-oriented way. Based on accurate and timely shared data, A-CDM allows a better decision making with all airport partners having the same operational picture.

Figure 1: Visualization of the A-CDM Platform

The concept aims to improve operational efficiency at airports by reducing delays, improving the predictability of events during the progress of a flight and optimizing the utilization of resources. A-CDM is a continuous process beginning with processing of the ATC Flight plan, via landing of the inbound flight, the turnaround process on the ground, to departure.

The A-CDM concept is implemented in various airports across Europe.

3.1.1. Benefits of A-CDM

The implementation of A-CDM has several benefits for all involved partners. Following some examples:

- Align different data from AO, GH, AP and ATC to a common dataset
- Improve predictability
- Reduce ground movement costs
- Optimize use of ground handling resources
- Optimize use of stands, gates and terminals
- Optimize the use of the airport infrastructure and reduce congestion
- Flexible pre-departure planning
- Reduce apron and taxiway congestion

With A-CDM, the network is served also with more accurate take-off information to derive ATFM slots. As more airports implement A-CDM, the network will be able to effectively utilize available slots more efficiently and reduce the current buffer capacity. This results in more transparency and plannability.

3.1.2. ZRH Airport partners and their support to the A-CDM adjustment

All partners are playing an important role within the A-CDM concept. Therefore, they have to fulfill various tasks in order to guarantee a smooth daily operation within the EUROCONTROL network.

Ground Handler

- Monitor handling processes and report deviations from SOBT in a consistent and timely manner by modifying the TOBT.
- Modify the TOBT if the EOBT deviates by more than 15 minutes from the existing TOBT.
- No changes of less than 5 minutes to TOBT and no changes later than 5 minutes before existing TOBT.
  ➔ Stability of departure sequence and CTOT
- Pushback tractors must be at the aircraft and ready for immediate pushback at TSAT -5 minutes.

Aircraft Operator

- Monitor handling processes and report deviations from SOBT in a consistent and timely manner by modifying the TOBT.
- Modify the TOBT if the EOBT deviates by more than 15 minutes from the existing TOBT.
- Update the EOBT if it deviates by more than +15 minutes from the TOBT.
- No changes of less than 5 minutes to TOBT and no changes later than 5 minutes before existing TOBT.
  ➔ Stability of departure sequence and CTOT

ATC

- Clearance Delivery (CLD) monitors aircraft ready process and transfers ready aircraft within TOBT +/- 5 minutes tolerance window to Apron Control (APRON).
- No further processing of departures, which are not ready within TOBT +/- 5 minutes tolerance window.
- Generally, APRON should not give start-up and/or pushback clearance before TSAT -5 minutes.

Flight Crew

- Provide support in monitoring the aircraft ready process and ensuring it is complete within the TOBT +/- 5 minutes tolerance window by reporting relevant deviations to the GH or Airline Control Centre in due time.
- Do not report the aircraft as ready to CLD until all ground handling activities are completed. On-stand de-icing is not considered as a ground handling activity.
- Notify CLD 15 minutes before TOBT at the latest if the standard departure RWY cannot be accepted.
- If the aircraft needs to be de-iced, request de-icing not later than TOBT -15 minutes on the adequate frequency.

Airport Operation

- For all departure runways, the TSAT is sent to AIMS from TOBT -45 minutes.
- From TOBT -5 minutes the TSAT is displayed on the dock guidance system (DGS).

3.1.2.1. Obligations to the Ground Handlers according "third-party handling authorization"

Zurich Airport is an A-CDM airport, and all organisations involved in the handling process (third-party and self-handling authorization) must promptly submit their relevant operational information in accordance with the A-CDM requirements and regulations to the requisite degree of accuracy.

The milestones defined in the A-CDM Manual are mandatory. The defined information, the timing and accuracy of which are crucially important and are checked by Flughafen Zürich AG.

Further information and/or data regarding the A-CDM process at Zurich Airport can be claimed according the definitions in this manual.

3.2. The concept elements of A-CDM

The A-CDM concept consists of six core elements. These guidelines for the concept are based on operational harmonization (EUROCONTROL), technical standardization (EUROCAE) and a mandate of the European Commission.

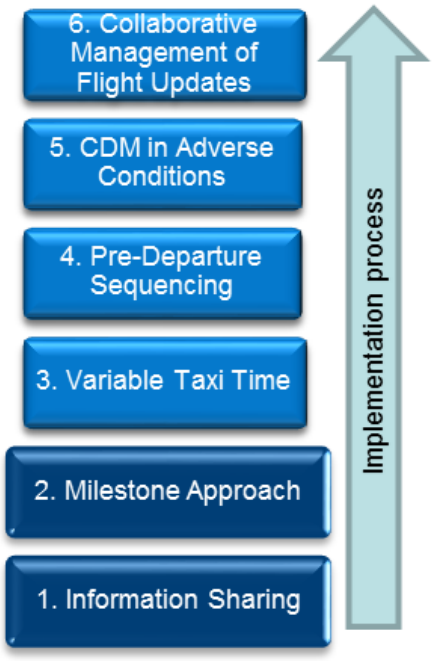

Figure 2: The Concept Element of A-CDM

1. **Information Sharing**: Information sharing aims to share the latest data important for the turnaround process to all partners involved at the right time using an A-CDM platform (IT-Tool, interface). This element is in fact the "glue" that ties the partners together in their aim to efficiently coordinate airport activities, and forms the foundation for other A-CDM concept elements.

2. **Milestone Approach:** The approach consists of 16 Milestones (=significant events) which take place during the inbound, turnaround and outbound process of a flight. The progress of a flight is tracked in the A-CDM platform by a continuous sequence of different events and rules for updating downstream information and the target accuracy of the estimates are defined. Different A-CDM partners can be responsible for different Milestones, with the aim of integrating all of the Milestones into a common seamless process for the flight.

   ➔ For further information about the Milestone Approach at ZRH Airport, refer to chapter 4.0.

3. **Variable Taxi Time:** By using Variable Taxi Times (VTT) instead of default taxi times, more realistic in-block- and take-off times can be provided which reflect the airport layout and limitations. These accurate taxi times are essential for calculating EIBT, ETOT, TTOT and CTOT. Moreover, the VTT will be beneficial for stand and gate planning, pre-departure sequencing, ground handling resource management and the optimization of flow and capacity management of European air traffic.

4. **Collaborative Pre-departure Sequence:** By implementing pre-departure sequencing, an optimized off-block sequence is being generated, taking into account operational aspects and limitations. Pre-departure sequencing allows ATC to handle the TOBTs obtained from the turnaround process in a way that flights can depart from their stands in a more efficient and optimal order. Switching from the old "first come - first served" principle to the new "best planned - best served" principle.

5. **CDM in Adverse Conditions:** This concept element enables an efficient management of the operation during times, where the capacity at the airport is limited, such as winter OPS or an aircraft incident/accident. Moreover, this element aims to facilitate a swift return to normal capacity once adverse conditions no longer prevail.

   ➔ For further information about Adverse Conditions at ZRH Airport, refer to chapter 5.0.

6. **Collaborative Management of Flight Updates:** The exchange of arrival and departure information with the NMOC allows a more accurate planning for all flights. This core element improves the predictability of ground operations and allows a more accurate and more predictable view of the traffic situation, resulting in improved ATFM slot allocation.

   The exchange of arrival and departure information between the Network Operations and the airport is realized by:

   - Sending DPI messages from the airport concerned to the Network Operations
   - Sending FUM from the Network Operations to the airports concerned

3.3. Data exchange with NMOC

With the core element “Collaborative Management of Flight Updates”, the CDM Airport is connected with the NMOC respectively with the ATFM Network. Via this connection, two different messages about the status of each flight are exchanged:

- Flight Update Message (FUM)
- Departure Planning Information (DPI) Message

FUM and DPI are system-to-system messages, triggered by events and sent automatically. In an environment where “Collaborative Management of Flight Updates” has been implemented, actions such

as confirming the TOBT and other Milestones have a significance that extend into the core of the flow management process and local procedures must reflect this.

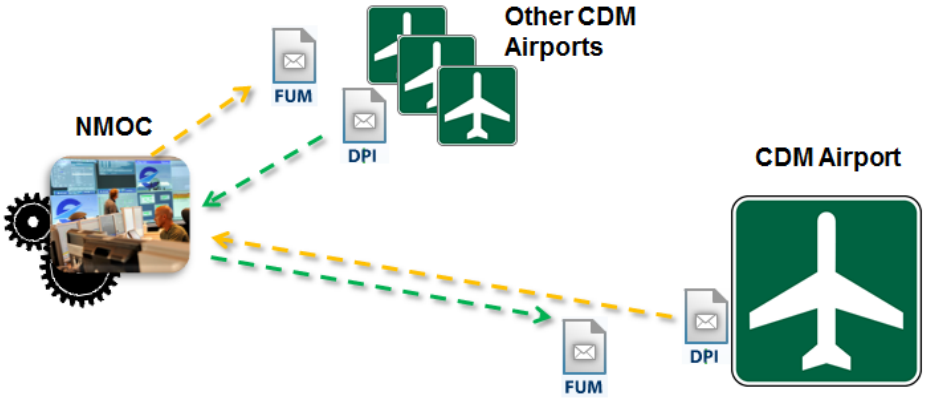

Figure 3: Data Exchange with NMOC

3.3.1. Flight Update Message

The FUM messages, which are sent by NMOC, contain the ELDT of each flight. The first FUM message is sent 3 hours prior to ELDT and will be updated if the ELDT differs more than 5 minutes.

➔ Note that FUM in ZRH Airport is actually not in use due to matching difficulties IATA/ICAO. The landing times are based on local procedures.

3.3.2. Departure Planning Information

DPI messages supplies the NMOC with flight data related updates. The DPI messages contain for each outbound flight, the TOBT, TSAT and TTOT.

Based upon the A-CDM concept, five different types of DPI messages, containing the latest data for the further planning of a flight, have been defined. All DPI messages are being updated continuously according to the NMOC guidelines.

By changing the time values of TOBT, TSAT, TTOT, EOBT, EXOT by more than 5 minutes or changes in data fields like A/C Type, SID, AREG, De-icing request, ACID, ADES an update of the DPI message is triggered.

Following table describes the different types of DPI messages in detail:

Type	Timeline	Description
E-DPI (Early-DPI)	EOBT -3h to EOBT -2h	By sending the E-DPI to NMOC the airport successfully performed the consistency check between the airport slot (SOBT) and the flight plan (EOBT). Within the E-DPI message the currently actual and valid times like EOBT, SOBT, TOBT (if exists), VTT and TTOT are being transmitted to NMOC.
T-DPI-t (Target-DPI-target)	EOBT -2h to TOBT -40min	Within the T-DPI-t the actual and valid times like TOBT, VTT and TTOT are being transmitted to NMOC and updated if a time value changes more than 5minutes.

		This is also the time, where a possible CTOT is allocated by NMOC, in best case (depending on the regulation) CTOT = TTOT.
T-DPI-s (Target-DPI-sequenced)	Non-regulated flights TOBT -40min	Within the T-DPI-s message, the currently actual and valid times like TOBT, VTT, TSAT and TTOT are being transmitted to NMOC and updated by any change of a time value by more than 5minutes.
	Regulated flights If CTOT matches TOBT + VTT: TOBT -40min If CTOT is way beyond TOBT + VTT: TSAT -10min	
A-DPI (ATC-DPI)	Open stand: Begin Taxi Time (BTT)	The purpose of the A-DPI is to inform the NMOC about the actual off block time (AOBT) and to update the latest TTOT. Moreover, the A-DPI freezes the CTOT and Flight plan updates.
	Gate stand: Start-up and/or pushback time	
C-DPI (Cancel-DPI)	Upon special events	The purpose of the C-DPI is to supply the NMOC with a cancellation of a previously sent ETOT or TTOT. The C-DPI triggers a Flight Suspension Message (FLS) by the NMOC.

➔ A graphic of the various DPI messages in combination with the Milestones and CDM alerts at ZRH Airport can be found in the appendix under chapter 9.1.

3.4. Key A-CDM information/data at ZRH Airport

3.4.1. TOBT – Target Off-Block Time

The TOBT is the expected time, at which an aircraft will be ready for pushback and/or start-up, when all ground handling activities have been completed:

- **all doors closed**
- **passenger boarding bridge removed**
- **without pushback tractor**
- **without on stand de-icing**

The TOBT has a tolerance window of +/- 5 minutes. The aircraft must be ready for pushback and/or start-up within this tolerance window, meaning the Flight Crew must report ready to the ATC (CLD) within this timeframe. The subsequent ATC processes, e.g. runway allocation and calculation of airspace capacity, are based on this TOBT.

For each individual departure, the TOBT can be modified as often as required, namely + and -. The final TOBT update shall be made no later than 5 minutes before the current TOBT. This ensures calculations of the off-block sequence with minimum disturbance.

The AO and/or GH is responsible to report the TOBT. The TOBT is displayed on the DGS 30 minutes before the planned off-block time. At stands with no DGS, either the GH or AO is responsible for communicating the TOBT to the Flight Crew.

The TOBT is derived either from the SOBT or in case of delay, from the ETD or SED (Staff ETD). The GH are responsible for adhering to the TOBT. Incorrect or imprecise TOBT, piling of TOBT's with the same time or a delay in supplying this information has a negative effect on the calculation of the overall off-block sequence and/or the allocation of a CTOT. This in return can result in TSAT fluctuations and runway capacity not being fully utilized, especially during peak hours.

Zurich Airport is a fully coordinated airport, meaning the airport slot are approved by the Slot Coordination Switzerland (SCS). In this regard, EOBT and SOBT must be in line initially. Deviations are treated as described in chapter 3.5.1.

3.4.2. ARDT – Actual Ready Time

ARDT is the time, at which the aircraft is ready according the TOBT definition and the flight crew reports this to Delivery and the flight is transferred to Apron Control for further processing

The aircraft ready call shall be made in the TOBT window of +/- 5 minutes.

Once the flight has reported ready to ATC, no further TOBT updates will be taken into account in determining the off-block sequence.

3.4.3. TSAT – Target Start-Up Approval Time

The TSAT is the time, at which an aircraft can expect pushback and/or start-up clearance from Apron Control

The TSAT has a tolerance window of +/- 5 minutes. APRON manages the traffic within this timeframe and the Flight Crew can expect start-up clearance within this tolerance window. Therefore, the pushback tractor must be connected and ready at TSAT -5 minutes so pushback can occur immediately after receipt of the respective clearance from APRON.

For stabilization purposes, the TSAT is frozen at TOBT -5 minutes. A TOBT update beyond TSAT time will always result in a TSAT recalculation. A TOBT update up to TSAT time should not affect the current TSAT.

From TOBT -5 minutes onwards, the TSAT is displayed on the DGS, alternating with the TOBT & TTOT. At stands with no DGS, the TSAT is communicated to the cockpit by APRON if it differs from the TOBT by more than 5 minutes.

The TSAT is calculated by the DMAN based on TOBT and sent to AIMS 45 minutes before the TOBT and subsequently is displayed. Late or unprecise updates/inputs of the TOBT may result in unreliable and fluctuating TSATs.

Further factors included into the calculation of TSAT are (not complete):

- Runway assignment and throughput
- Operational capacity
- Aircraft de-icing
- Variable Taxi Time
- Sequence changes
- Aircraft type (speed & wake)
- Flight safety restrictions such as CTOT
- Special departure intervals

3.4.4. TTOT – Target Take-off Time

TTOT is the time, at which a flight can expect take-off

The TTOT is calculated by the DMAN based on the TOBT and the above mentioned factors/restrictions. If remote de-icing is required, the time spent at the de-icing pad is also taken into account. In its calculations, the DMAN attempts to balance demand with available runway capacity in an optimized way. If several flights are aiming to take-off from the same runway at the same time (TOBT + EXOT), the DMAN will calculate the TSATs in a way that ensures no identical TTOT is assigned for flights on the same runway, and that the required intervals between the departing aircraft (wake & SID) are respected and minimized.

3.4.5. EOBT – Estimated Off-Block Time

The EOBT is the estimated off-block time, filed in the ICAO flight plan

The EOBT must be reported and maintained by the AO. Initially the EOBT must match with the Airport Slot (SOBT). The AO must report deviations of more than 15 minutes from the original EOBT.

If there is a difference of more than 15 minutes between the EOBT and the TOBT, an update is required. The NMOC offers a service, which automatically adjusts the EOBT to match the TOBT if this is the case.

3.4.6. CTOT – Calculated Take-Off Time

CTOT is the time calculated and issued by NMOC, as a result of tactical slot allocation, at which a flight is expected to become airborne

The CTOT has a standard tolerance of -5/+10 minutes and must be respected. During difficult situations at the departure airport the tolerance window can be extended prior coordination. ATC slots must be taken into account for the calculations of TSAT/TTOT.

In order to avoid airspace congestion, whether this is due to bad weather or demand exceeding airspace capacity, the NMOC allocates ATC slots.

3.5. Processes and procedures of A-CDM at ZRH Airport

3.5.1. Deviations between TOBT and EOBT

It is essential that the TOBT and the EOBT correspond with a tolerance window of +/- 15 minutes. The AO or GH is responsible for ensuring this.

If the EOBT deviates by more than +15 minutes from the TOBT, AIMS will send an alert to the responsible GH to update the TOBT in order to be in line with the EOBT.

If the TOBT deviates by more than +15 minutes from the EOBT, an alert (telex, e-mail) will be sent to the AO to update the EOBT in order to be in line with the TOBT.

3.5.2. **Flight must be ready at TOBT +/- 5 minutes**

All activities needed to prepare the aircraft must be completed and the Flight Crew must report ready to CLD at TOBT +/- 5 minutes regardless of whether or not the flight has an ATC slot and of which runway is required. This also applies if the aircraft still has to be de-iced on the stand. The time required for aircraft de-icing is reflected in the TSAT.

Flights which are not ready within the TOBT +/- 5 minutes tolerance window will not be cleared by ATC. The TOBT must first be adjusted as required. Aircraft not ready at TOBT +6 minutes are taken out of the departure sequence and may receive a penalty TSAT when re-inserted by TOBT update.

If an aircraft is not ready at TOBT +15 minutes this can automatically trigger a C-DPI to the NMOC which will result in a flight suspension. If this happens, the EOBT and the TOBT must be updated to remove the suspension and reinsert the flight into the sequence.

3.5.3. **TSAT and effects of TOBT updates**

From the moment the TSAT has been calculated and communicated, TOBT updates might affect the TSAT. In order to limit unnecessary delays and recalculations, the following rule applies:

New TOBT > Old TOBT = no recalculation of the TSAT as long as the New TOBT ≤ TSAT.

In order to avoid TSAT fluctuations, the TSAT is frozen at time TOBT -5 minutes. Any update of TOBT > TSAT or any external factors such as CTOT or De-icing request will unfreeze the TSAT and lead to a recalculation.

3.5.4. **Departures with a CTOT**

Updating the TOBT to the TSAT or earlier should generally not affect the CTOT. However, new or increased restrictions on airspace or at the destination airport can result in a new CTOT.

Departures assigned with a CTOT must be ready at TOBT +/- 5 minutes. Late TOBT adjustments or ones outside the limits have a negative effect on the allocation of a CTOT.

If there are difficult local conditions such as bad weather or snow removal, or if there is a high number of regulated departures, then and with the prior approval by NMOC, ATC can adjust the standard tolerance window (Slot Tolerance Window (STW) Extension).

3.6. **A-CDM Terminology at ZRH Airport**

With the implementation of the A-CDM terminology, it has been agreed, that ZRH Airport still uses ETD to indicate delays concerning the turnaround process. However, on ATC Systems, on DGS and on the specific FIDS pages, the new terms TOBT, TSAT and TTOT are used and displayed.

4. The Milestone Approach at ZRH Airport

The Milestone Approach is a method to monitor the progress of a flight. As a result, more accurate planning data and early warnings to e.g. AOs and GHs can be deflected, if, for example a flight has left his origin too late.

Each significant event during the inbound, turnaround and outbound phase represents a so-called Milestone (16 in total). Each time a Milestone event is delayed or does not take place at all, has a direct impact on the subsequent Milestones. By implementing the Milestone Approach it is assured, that the partners receive the data early enough to react accordingly.

The Milestone Approach, described on the next few pages, is defined according to the Airport CDM Implementation Manual of EUROCONTROL.

Following a visualization and a tabular overview of the 16 Milestones. The light grey Milestones are currently not implemented at ZRH Airport.

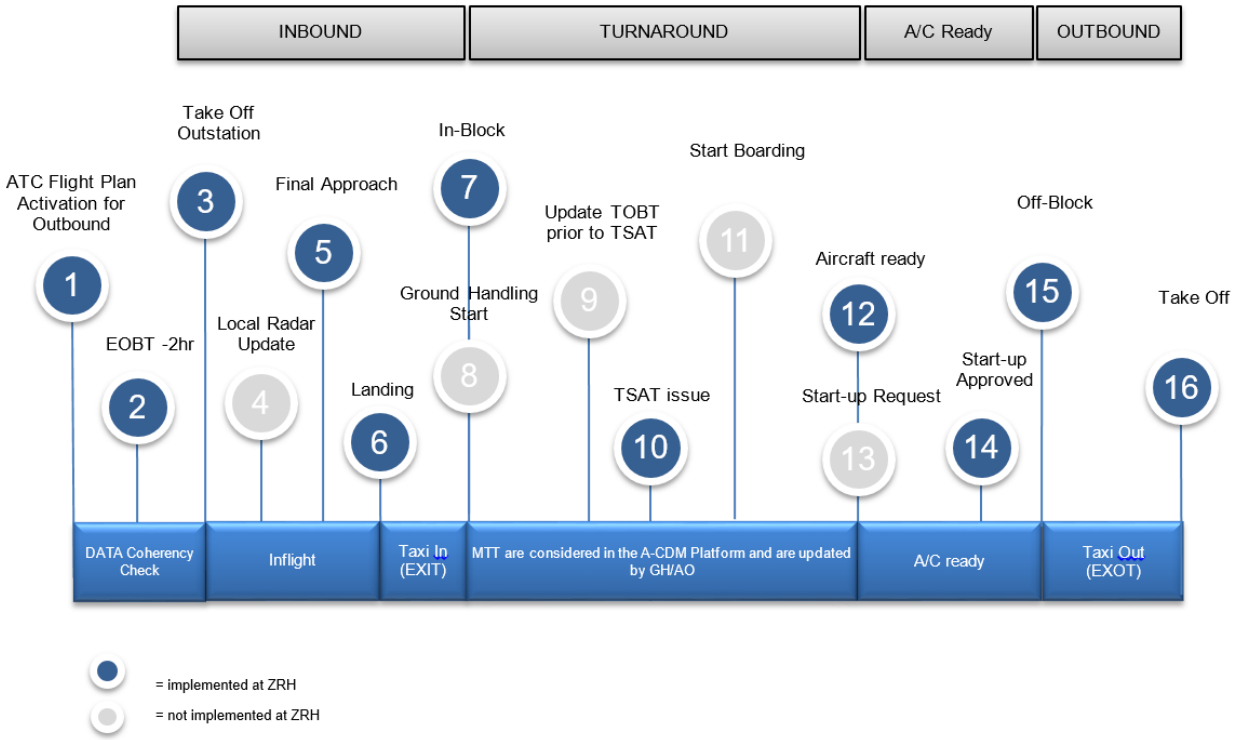

Figure 4: Visualization of the Milestones used at ZRH Airport

Milestone	Description	@ ZRH Airport	Comment
1	ATC flight plan activated	Implemented	
2	EOBT -2h	Implemented	
3	Take-off from outstation	Implemented	
4	Local radar update	**NO**	Not accurate enough
5	Final approach	Implemented	
6	Landed	Implemented	

7	In-block	Implemented	
8	Ground handling started	**NO**	None additional value
9	Final confirmation of the TOBT	**NO**	All TOBT accepted
10	TSAT issued	Implemented	
11	Boarding starts	**NO**	None additional value
12	Aircraft ready	Implemented	
13	Start-up request	**NO**	Integrated in Milestone 12
14	Start-up approved	Implemented	
15	Off-block	Implemented	
16	Take-off	Implemented	

4.1. CDM Alerts

To support early reaction on unforeseen events during the Milestone Approach and to help daily OPS to identify discrepancies, an alerting mechanism is established. According to the A-CDM Implementation Manual of EUROCONTROL, there are 14 pre-defined A-CDM alerts. The aim of those alerts is to sensitize AOs and/or GHs on issues needed to be solved.

Following table presents the 14 different A-CDM alerts:

CDM Alert	Description	Applicable to Milestone	Alert Type	@ ZRH Airport
CDM01	No airport slot available or slot already correlated	1	primary	not active
CDM02	SOBT vs EOBT discrepancy	1	secondary	active
CDM03	Aircraft type discrepancy	1 – 14	advisory	on hold
CDM04	Aircraft registration discrepancy	1 – 14	advisory	not active
CDM05	Destination discrepancy	1	advisory	active
CDM06	None-airborne alert	3	advisory	active
CDM07	EIBT + MTTT discrepancy with EOBT	2 – 5	advisory	active
CDM08	EOBT compliance alert	5 – 12	secondary	active
CDM09	Boarding not started	11	advisory	not active
CDM10	TOBT rejected or deleted/Advise Time set	9 or later	advisory	partly active
CDM11	Flight not compliant with TOBT/TSAT	12 and 13	advisory	on hold
CDM12	TSAT not respected by ATC	13	advisory	on hold
CDM13	No ATC flight plan available	1 – 16	primary	active
CDM14	Automatic TOBT Generation not possible	4 - 9	advisory	not active

The alerts are not a mandatory item for A-CDM implementation, but are highly recommended. At ZRH Airport, the alerts are either sent via SITA-Telex Message or e-mail or are shown in the AIMS alarm window.

➔ A graphic of the various CDM alerts in combination with the Milestones and DPI messages at ZRH Airport can be found in the appendix under chapter 9.1.

Important:

- The alerts are a hint/indication, that something in or even before the turnaround process went wrong or data are not aligned and may create an issue in the following steps or needs immediate attention.
- It is up to the partners to react to the alarms. By resolving pending issues, the whole turnaround process can be smoothened and the planning results are much more reliable.

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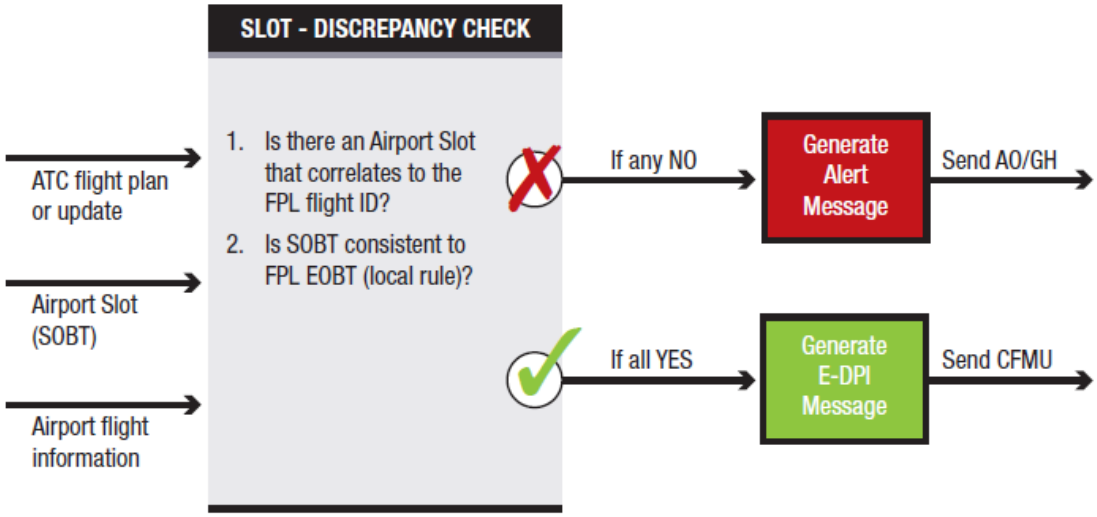
4.2. Milestone 1 – ATC flight plan activated

Objective

To check consistency between ATC flight plan, airport slot and airport flight data and then confirm the flight to the Network Operations and allow further local processing of the flight.



Description

This check is highly recommended to be performed to verify the consistency between the ATC flight plan, airport slot and airport flight data before the first E-DPI is sent. The AO must provide correct information before this first E-DPI message, in order to feed Network Operations with consistent SOBT, aircraft registration, and first destination data, as early in time as possible. The E-DPI message is recommended not to be sent if no or inconsistent information is provided.

Input

Input is the ATC flight plan or an update of it and airport flight information.

Process

The ATC flight plan (at the earliest EOBT-3h), together with airport slot and airport flight data are correlated. This is done by several data checks, where each time the answer should be YES. If any check fails, an alert message is generated. If all pass, an E-DPI message is highly recommended to be generated. Subsequent E-DPI may be sent if defined parameters change such as aircraft registration, TTOT, SID etc.

Output

Output is either the E-DPI message to Network Operations or an alert message is recommended to be generated to the AO/GH.

Response to alert messages – AO/GH

Update ATC flight plan and/or resolve the airport slot discrepancy.

Consequences of no action following alert messages

No E-DPI message is recommended to be sent and no A-CDM process is recommended to commence until the provided information is confirmed as early as possible and airport slot discrepancies are resolved.

4.2.1. Implementation of Milestone 1 at ZRH Airport

Item	Trigger Event	Data Source	Alerts
SOBT/EOBT discrepancy check	EOBT -180min	STD/ETD (AIMS) ATC flight plan EOBT (TRACE/FDPZ)	CDM02 Alert: SITA-Telex to AO AIMS alarm window
Procedure:	180 minutes prior to flight plan EOBT, the ATC flight plan is compared with the airport slot (SOBT). If at this time a TOBT is already available, the comparison is between EOBT and TOBT. If the times are not within a defined time window of +/- 15 minutes, an alert message will be generated and sent to the AO via SITA-Telex requesting to update the flight plan EOBT and/or to inform the GH about new EOBT. In case that an advice time is entered for an outbound flight by GH, the discrepancy check will not be conducted and therefore no CDM02 alert will be sent to the AO. However, a warning message will be displayed at the AIMS alarm window. Due to the fact, that this check will be performed only once (as soon as flight plan is available, usually 3h prior EOBT), an additional alert will be generated in the AIMS alarm window, when the flight plan is updated again. At this time, an E-DPI-message will be sent to NMOC: If EOBT is ≤ SOBT-15 minutes then the master time for DPI provision is SOBT If EOBT is ≥ SOBT-15 minutes then the master time for DPI provision is EOBT Exception: No alert will be sent for BA/GA Aircraft Operator due to unknown flight plan originator.		

Item	Trigger Event	Data Source	Alerts
A/C type confirmation	180min prior SOBT/EOBT	ATC flight plan (TRACE/FDPZ) ICT (AIMS)	CDM03 Alert: AIMS alarm window
Procedure:	Together with the EOBT, TRACE/FDPZ transmits the aircraft type (ICAO type designator) to AIMS. Normally, the aircraft type defined in the flight plan is a more present value and will be treated prioritized. The aircraft type provided by TRACE/FDPZ is automatically fed into AIMS and is displayed in a separate table/column.		

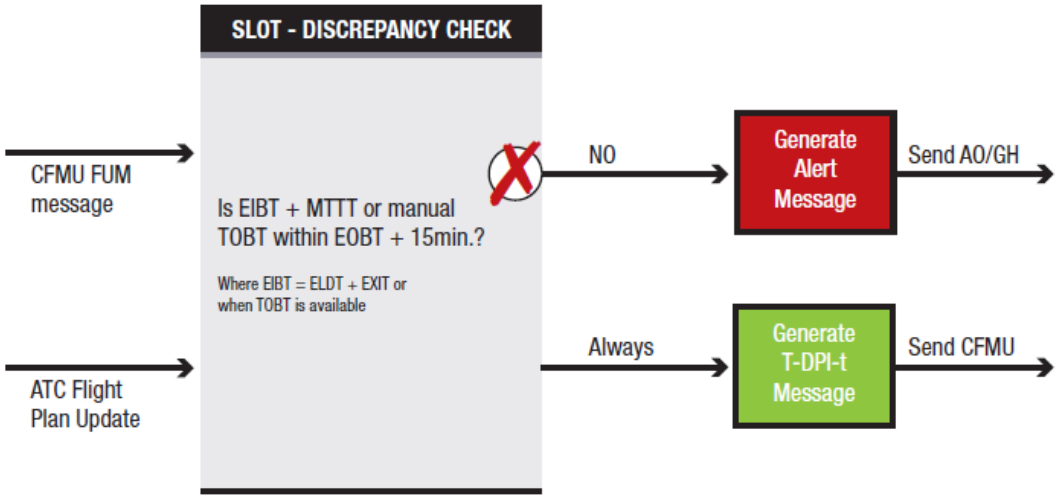
Item	Trigger Event	Data Source	Alerts
Confirmation of first destination	180min prior SOBT/EOBT	ATC flight plan (TRACE/FDPZ) DES (AIMS)	CDM05 Alert: AIMS alarm window
Procedure:	Together with the EOBT, the first destination airport will be sent from TRACE/FDPZ to AIMS. Therefore, the ICAO abbreviation is used. If the destination included in the ATC flight plan does not match the next station data field in AIMS (VI1 or DES), an alarm will be displayed in AIMS alarm window. By trend, the destination filed in the flight plan is a more current value and will be treated prioritized.		

Item	Trigger Event	Data Source	Alerts
No ATC flight plan	150min prior SOBT	STD (AIMS)	CDM13 Alert: SITA-Telex to AO
Procedure:	If a flight is published in AIMS but the ATC flight plan is not received in AIMS until 150 minutes prior SOBT, an alert is sent to the AO requesting to file the corresponding flight plan. Exception: No alert will be sent for BA/GA Aircraft Operator due to unknown flight plan Originator.		

4.3. Milestone 2 – EOBT -2h

Objective

To check (before or after take-off from outstation) whether AO/GH flight estimates are consistent with the ATC flight plan and to inform Network Operations about the updated take-off time estimate, using a T-DPI message.



Description

This check is highly recommended to be performed to verify feasibility of the ATC flight plan estimated off-block time at EOBT -2h. At EOBT -2h Network Operations is informed through the first T-DPI message. Calculation basis for the TTOT is highly recommended to take into account EIBT+MTTT+EXOT, if later than EOBT+EXOT. In the case of manual input of TOBT, this estimate will override the EIBT+MTTT estimate, hence TTOT equals TOBT+EXOT.

Input

FUM, local procedure, and/or ATC flight plan update.

Process

At EOBT -2h the ELDT, EXIT and the MTTT are highly recommended to be checked against the ATC flight plan EOBT +15 minutes. In case a TOBT is already available, this TOBT can replace ELDT+EXIT+MTTT. If the calculated estimate or available TOBT is greater than EOBT +15 minutes the AO/GH is recommended to be informed.

Output

At all times a T-DPI message is sent to Network Operations including any updates following change to TTOT, SID etc. If the FPL discrepancy check fails, an alert message is recommended to be generated and sent to AO/GH. At this stage the T-DPI may have the status: P (provisional).

Response to alert messages – AO/GH

Submit a delay/change message or cancel and refile the ATC flight plan to resolve the discrepancies.

Response to alert messages – Network Operations

The Network Operations may update the flight profile, generate, update or cancel the CTOT according to the new TTOT and SID.

Consequences of no action following alert messages

Not applicable.

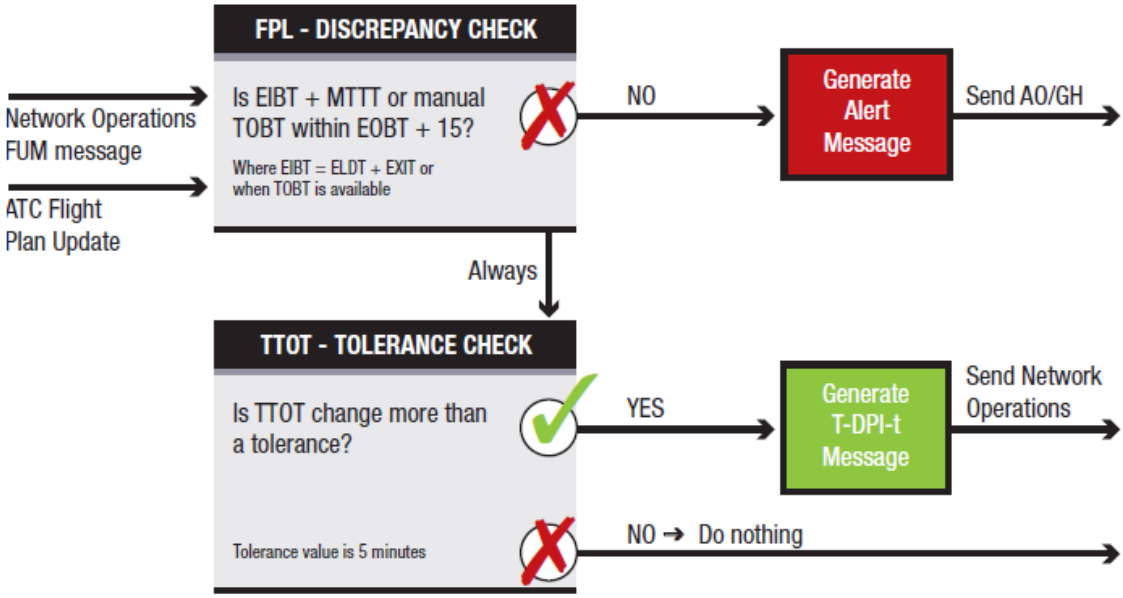
4.3.1. Implementation of Milestone 2 at ZRH Airport

Item	Trigger Event	Data Source	Alerts
TOBT/EOBT discrepancy check	EOBT -120min	ATC flight plan EOBT (TRACE/FDPZ) STD/ETD (AIMS)	CDM02 Alert: AIMS alarm window
Procedure:	If the AO updates his EOBT due to a re-planning or operational constraints, and this EOBT differs more than 15 minutes from TOBT, a warning will be displayed in the AIMS alarm window. The GH is responsible to update the TOBT according to the flight plan EOBT. This discrepancy check is performed until reaching Milestone 6. Based on SOBT or if available TOBT, a T-DPI-t message is sent to NMOC.		

4.4. Milestone 3 – Take-off from outstation

Objective

To check whether the AO/GH estimated landing time after take-off from outstation are consistent with the outbound ATC flight plan, and when needed inform the Network Operations about the updated take-off time estimates using a T-DPI-t Message.



Description

This check is highly recommended to be performed to verify feasibility of the ATC flight plan at take-off from outstation. A TTOT tolerance of 5 minutes is respected before Network Operations is informed of the updated TTOT. Calculation basis for the TTOT is highly recommended to take into account EIBT+MTTT+EXOT. In case EOBT is later than EIBT+MTTT, TTOT equals EOBT+EXOT. In the case where TOBT is available this prediction will overrule the EIBT+MTTT estimate, hence TTOT equals TOBT+EXOT.

Input

FUM after outstation take-off and ATC flight plan update or any other relevant information.

Process

The EXIT plus MTTT is added to the ELDT. The resulting time is highly recommended be checked against the ATC flight plan EOBT +15 minutes of the outbound flight. In case TOBT is already available, this TOBT can replace ELDT+EXIT+MTTT. In case the calculated estimate or the available TOBT is not within the EOBT tolerance the AO/GH is recommended to be informed. A TTOT update is checked against the TTOT tolerance value before Network Operations is informed about a changed TTOT.

Output

A T-DPI-t message is sent to Network Operations only when the TTOT changes by more than the TTOT tolerance or if the SID, aircraft type or registration is modified. If the FPL discrepancy check fails, an alert message is recommended to be generated and sent to the AO/GH.

Response to alert messages – AO/GH

Submit a delay/change message or cancel and refile the ATC flight plan to resolve the discrepancies.

Response to alert messages – Network Operations

The Network Operations may update the flight profile, generate, update or cancel the CTOT according to the new TTOT and SID.

Consequences of no action following alert messages

In case the flight is non-regulated it is recommended to be accepted into the ATC Pre-departure Sequence on the basis of the later calculated TOBT. In case the flight is regulated an updated or cancelled CTOT may be received and the flight will be sequenced accordingly. Also a non-regulated flight may become regulated.

4.4.1. Implementation of Milestone 3 at ZRH Airport

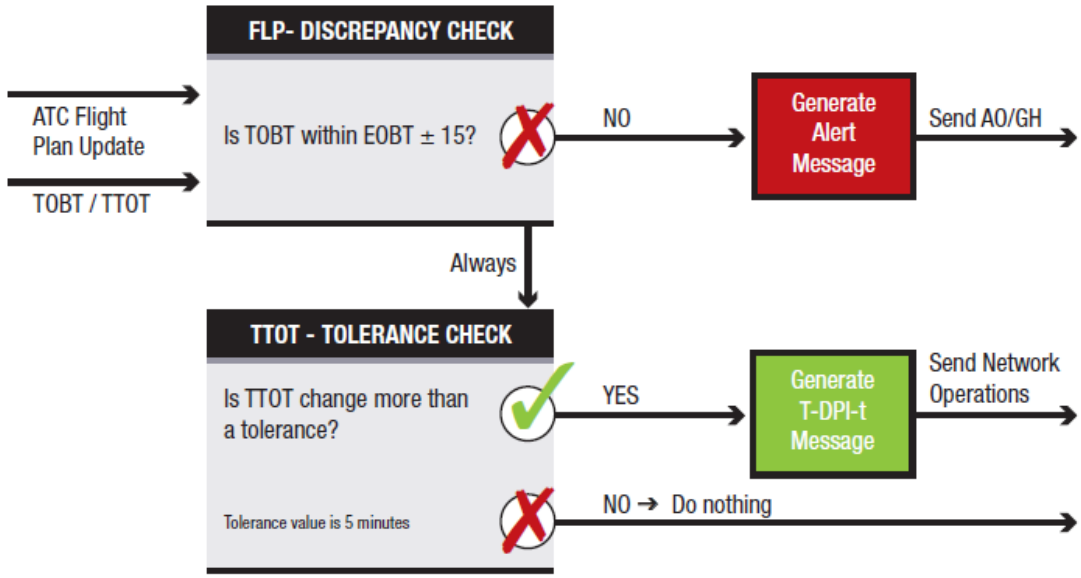
Item	Trigger Event	Data Source	Alerts
FPL discrepancy check	Take-off Outstation	MVT message (AIMS)	CDM06 Alert: AIMS alarm window
Procedure:	The AIMS MVT message (take-off origin/airborne time according flight plan/expected time of arrival) is used for the check of ETA + MTTT or manually set TOBT versus EOBT. If there is NO MVT message (airborne) an internal alarm will be displayed in AIMS alarm window. In case, Milestone 3 is active before Milestone 2 (e.g. flight time less than 2h): an updated E-DPI will be sent to NMOC when required.		

4.5. Milestones 4 and 5 – Local radar update/Final approach

➔ Note that Milestone 4 is not implemented at ZRH Airport

Objective

To commence the TOBT process and check whether the AO/GH TOBT is consistent with the ATC flight plan. Network Operations is informed when the TTOT changes by more than the agreed TTOT tolerance.



Description

This check is highly recommended to be performed to verify feasibility of the ATC flight plan given the updated TOBT. The TTOT tolerance is respected before Network Operations is informed of updated TTOT.

Input

ATC flight plan (or an update) and both TOBT and TTOT.

Process

As soon as TOBT is available, the TOBT is highly recommended to be checked against the ATC flight plan EOBT +/- 15 minutes. In case the TOBT prediction is not within the tolerance the AO/GH is recommended be informed. A TTOT update is checked against the TTOT tolerance value before Network Operations is informed about a changed TTOT.

Output

A T-DPI-t message is sent to Network Operations only when the TTOT changes by more than the TTOT tolerance or if the SID, aircraft type or registration is modified. If the FPL discrepancy check fails, an alert message is recommended to be generated and sent to the AO/GH.

Response to alert messages – AO/GH

Submit a delay/change message or cancel and refile the ATC flight plan to resolve the discrepancies, or modify TOBT.

Response to alert messages – Network Operations

The Network Operations may update the flight profile, generate, update or cancel the CTOT according to the new TTOT and SID.

Consequences of no action following alert messages

In case the flight is non-regulated it is recommended to be accepted into the ATC pre-departure sequence on the basis of the later calculated TOBT. In case the flight is regulated an updated or cancelled CTOT may be received and the flight will be sequenced accordingly. Also a non-regulated flight may become regulated.

4.5.1. Implementation of Milestone 4 at ZRH Airport

Item	Trigger Event	Data Source	Alerts
Local radar update	flight entering FIR Switzerland	Radar	none
Procedure:	Since it is already covered with Milestone 3, Milestone 4 is not implemented at ZRH Airport.		

4.5.2. Implementation of Milestone 5 at ZRH Airport

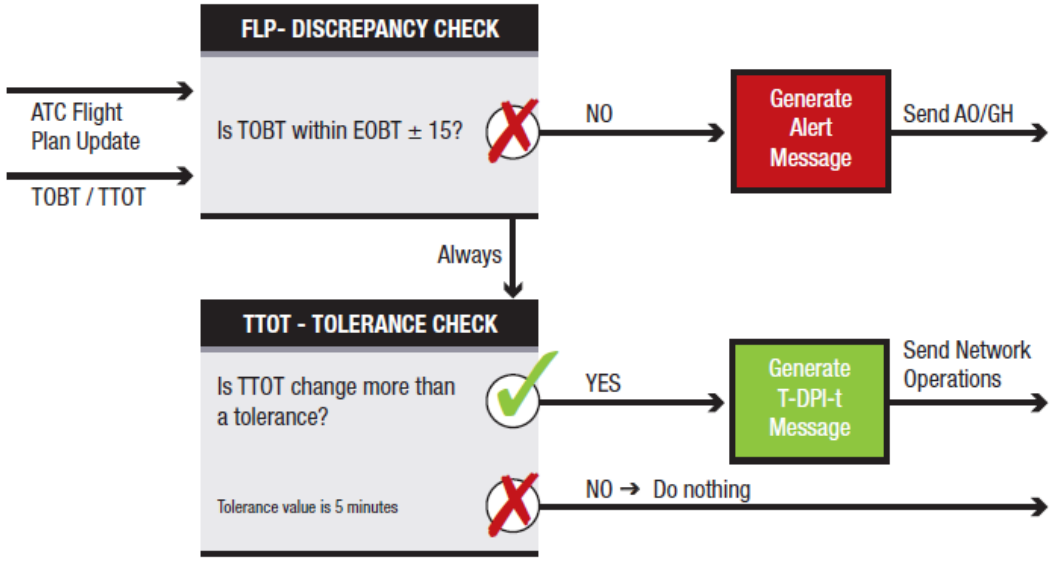
Item	Trigger Event	Data Source	Alerts
Final approach	Manual observation (ETA4)	Observation Radar EA4 (AIMS)	CDM08 Alert: AIMS alarm window
Procedure:	At the time-fix “final approach“ approximately 10 minutes before touchdown, ETA4 is manually fed into AIMS. Is ETA4 plus the provided MTTT > SOBT / ETD (TOBT), a Staff-ETD will be published automatically. For flights with long turnaround time or maintenance check after deboarding, no automatic Staff-ETD will be set. **Note for Line/Charter traffic:** To every inbound flight, an alarm is triggered in AIMS and presented to the GH, if the MTTT cannot be met anymore. The GH has then the option, to manually set a TOBT for the following outbound flight. If the MTTT is in line again (because the flights’ ETA is earlier than expected or a TOBT has been published by the GH), the alarm will be suspended. According to the published TOBT, manually set by GH or automatically by the system at the time ETA4, the TTOT might be updated. If the TTOT changes more than 5 minutes, an updated T-DPI-t will be sent to NMOC. **Note for GA/BA traffic:** No manual ETA4 input for all GA/BA flights is currently made. The AO or designated GH is responsible to organize new airport slots.		

4.6. Milestones 6, 7 and 8 – Landed/In-blocks/Ground Handling started

➔ Note that Milestone 8 is not implemented at ZRH Airport

Objective

To check whether the AO/GH TOBT is consistent with the ATC flight plan. Network Operations is informed when the TTOT changes by more than the agreed TTOT tolerance.



Description

This check is highly recommended to be performed to verify feasibility of the ATC flight plan given the updated TOBT or ATC flight plan. A TTOT tolerance is respected before Network Operations is informed on updated TTOT.

Input

ATC flight plan (or an update) and both TOBT and TTOT.

Process

The TOBT is highly recommended to be checked against the ATC flight plan EOBT +/- 15 minutes. In case the TOBT prediction is not within the tolerance the AO/GH is recommended to be informed. A TTOT update is checked against the TTOT tolerance value before Network Operations is informed about a changed TTOT.

Output

A T-DPI-t message is sent to Network Operations only when the TTOT changes by more than the TTOT tolerance or if the SID, aircraft type or registration is modified. If the FPL discrepancy check fails, an alert message is recommended to be generated and sent to the AO/GH.

Response to alert messages – AO/GH

Submit a delay/change message or cancel and refile the ATC flight plan to resolve the discrepancies, or modify TOBT.

Response to alert messages – Network Operations

The Network Operations may update the flight profile, generate, update or cancel an existing CTOT according to the new TTOT and SID.

Consequences of no action following alert messages

In case the flight is non-regulated it is recommended to be accepted into the ATC pre-departure sequence on the basis of the later calculated TOBT. In case the flight is regulated an updated or cancelled CTOT may be received and the flight will be sequenced accordingly. Also a non-regulated flight may become regulated.

4.6.1. **Implementation of Milestone 6 at ZRH Airport**

Item	**Trigger Event**	**Data Source**	**Alerts**
TOBT/EOBT check	Actual landing time	TDT (AIMS)	CDM08 Alert: SITA-Telex to AO
Procedure:	The touchdown message comes from the ATC system (TRACE) and is indicated either with an “L” in ETA time indication column in AIMS or is included in the data field TDT in AIMS showing the time of touchdown. At that time, the TOBT and EOBT will be compared. If the discrepancy exceeds 15 minutes, an alert message will be sent via SITA-Telex to the AO informing them, that the flight plan has to be updated. Additionally, the AO should inform the GH about the new EOBT. This alert will be sent between Milestone 6 and Milestone 12 (aircraft fully ready) whenever the flight plan EOBT differs more than 15 minutes from the ETD (TOBT).		

4.6.2. **Implementation of Milestone 7 at ZRH Airport**

Item	**Trigger Event**	**Data Source**	**Alerts**
TOBT/EOBT check	Actual in-block time	ATA (AIMS)	CDM08 Alert: SITA-Telex to AO
Procedure:	For Milestone 7 “Actual In-block”, the data field ATA in AIMS contains the in-block time, triggered by darts. In case that the parking position is still blocked, the data field ATA will contain the correct time, when the flight goes on-block.		

4.6.3. **Implementation of Milestone 8 at ZRH Airport**

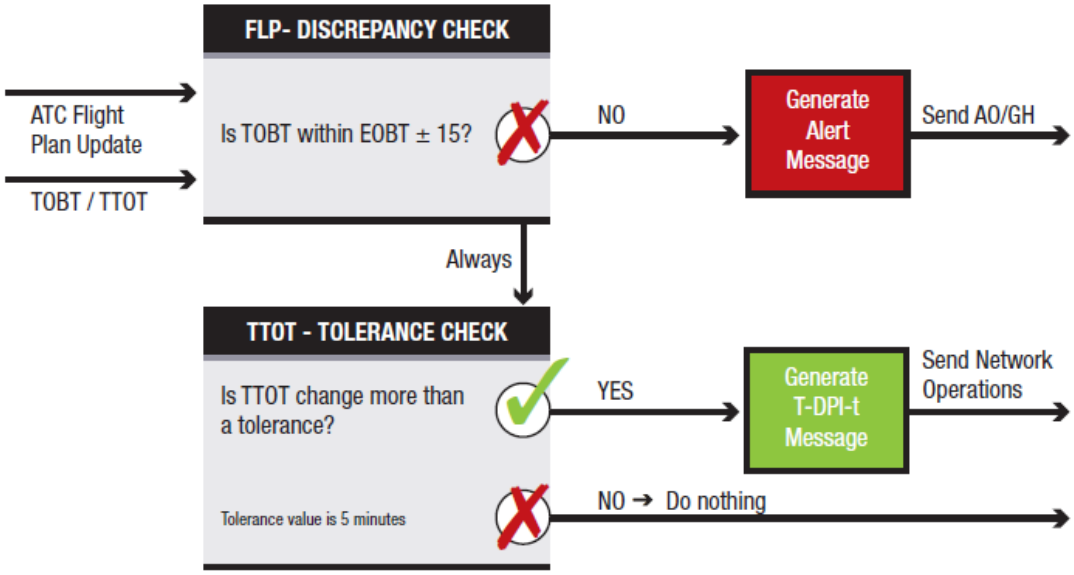
Item	**Trigger Event**	**Data Source**	**Alerts**
TOBT/EOBT check	Handling started	none	none
Procedure:	Milestone 8 “Handling Started” is not implemented at ZRH Airport. The timestamp “Handling Started” has no particular significance because the handling will start directly after an A/C is on-block, which corresponds to Milestone 7.		

4.7. Milestone 9 – TOBT confirmation prior to TSAT issue

➔ Note that Milestone 9 is not implemented at ZRH Airport

Objective

To check whether the AO/GH TOBT is consistent with the ATC flight plan. Network Operations is informed when the TTOT changes by more than the agreed TTOT tolerance.



Description

This check is recommended to be performed at a predefined time (local parameter) to confirm TOBT prior to TSAT issue and verify feasibility of the ATC flight plan estimates given the updated TOBT. A TTOT tolerance is respected before Network Operations is informed on updated TTOT.

This Milestone Process is actually constantly applicable in the A-CDM platform, as soon as a TOBT is available. However, the confirmed TOBT prior to TSAT has special status, where AO/GH check the quality of TOBT before TSAT issue.

Input

ATC flight plan (or an update) and both TOBT and TTOT.

Process

The TOBT is recommended to be checked against the ATC flight plan EOBT +/- 15 minutes. In case the TOBT prediction is not within this tolerance AO/GH is recommended to be informed. TTOT update is checked against the TTOT-tolerance value before Network Operations is informed about a changed TTOT.

Output

A T-DPI-t message is sent to Network Operations only when the TTOT changes by more than the TTOT tolerance or if the SID, aircraft type or registration is modified. If the FPL discrepancy check fails, an alert message should be generated and sent to the AO/GH.

Response to alert messages – AO/GH

Submit a delay/change message or cancel and refile the ATC flight plan to resolve the discrepancies, or modify TOBT.

Response to alert messages – Network Operations

The Network Operations may update the flight profile, generate, update or cancel the CTOT according to the new TTOT and SID.

Consequences of no action following alert messages

In case the flight is non-regulated it is recommended to be accepted into the ATC pre-departure sequence on the basis of the later calculated TOBT. In case the flight is regulated an updated or cancelled CTOT may be received and the flight will be sequenced accordingly. Also a non-regulated flight may become regulated.

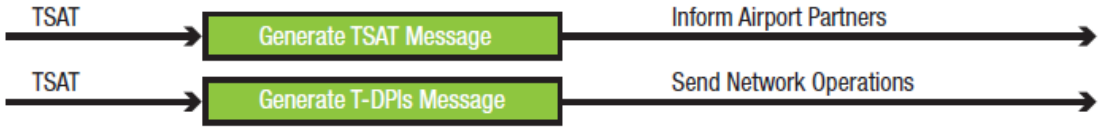
4.7.1. **Implementation of Milestone 9 at ZRH Airport**

Item	**Trigger Event**	**Data Source**	**Alerts**
TOBT confirmation prior to TSAT issue	New TOBT or TTOT	none	none
Procedure:	Milestone 9 is not implemented at ZRH Airport, because all TOBT are accepted.		

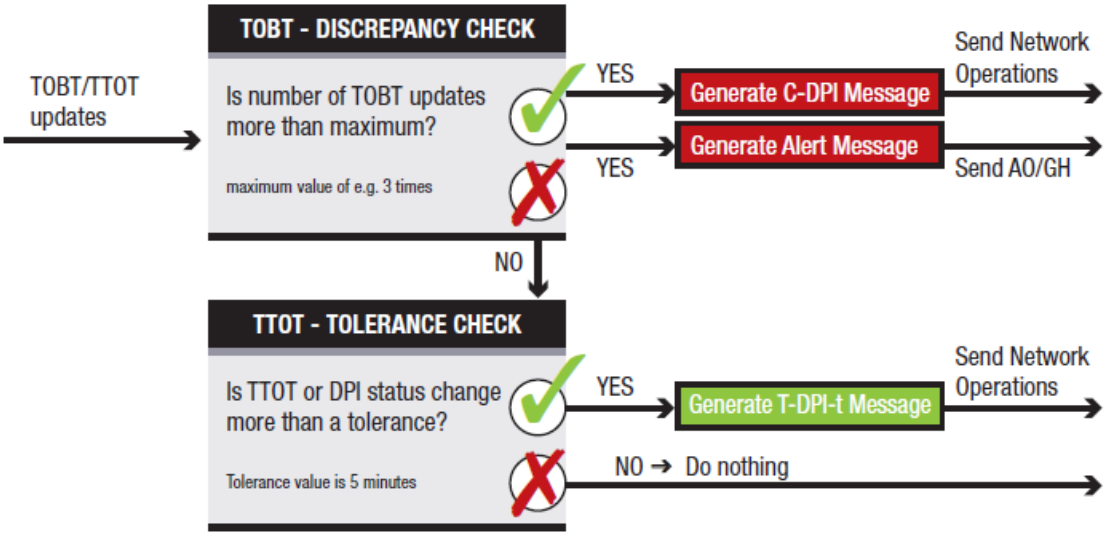
4.8. Milestone 10 – TSAT issued

Objective

First step: to inform all relevant partners of the TSAT that has been allocated to the flight. The Network Operations is informed by a T-DPI-s for non-regulated flights.



Second step: to check whether the number of TOBT updates exceeds a tolerance defined locally, after TSAT has been issued.



Description

First: The TSAT will indicate to the partners the time when the start-up approval can be expected. Network Operations is highly recommended to be informed with a T-DPI-s for non-regulated flights. No check is performed.

Second: A check is highly recommended to be performed to see the number of TOBT updates after TSAT has been issued. In case the number of TOBT updates exceeds a threshold, then the TOBT input is recommended to be processed according to local procedure.

Input

TOBT, number of TOBT updates after TSAT, and TTOT.

Process

TSAT will be calculated at a pre-defined time (local parameter) before TOBT. This TSAT is highly recommended to be issued (distributed) to the concerned CDM partners. When the TOBT is updated the amount of updates is highly recommended to be checked against a maximum of allowed changes

(local parameter). The AO/GH is informed when the maximum number of updates is obtained. Network Operations is informed when TOBT is deleted.

Output

TSAT is highly recommended to be available on the CDM Platform. A T-DPI-s message is sent to Network Operations including any updates following changes to TTOT, SID etc. for non-regulated flights. For regulated flights, the T-DPI-s will be based on a local trigger any time after TSAT generation (e.g. TSAT-10 minutes or start up given). In case of too many TOBT updates an alert message is recommended to generated and sent to the AO/GH.

Response to alert messages – AO/GH

Update your TOBT and if necessary submit a Delay message or cancel and re-file the ATC flight plan.

Response to alert messages – Network Operations

The Network Operations may update the flight profile, generate, update or cancel the CTOT according to the new TTOT and SID. In case of C-DPI, remove all previous received T-DPI information and fall back on latest available ATC flight plan information, maintaining latest VTT and SID.

Consequences of no action following alert messages

The flight may be re-sequenced according to local procedure until a new TOBT is sent. When the TOBT is deleted, the flight will be taken out of the sequence.

4.8.1. Implementation of Milestone 10 at ZRH Airport

Item	Trigger Event	Data Source	Alerts
TSAT issued	TOBT -40min	TSAT (darts) AOT (AIMS)	CDM08 Alert: SITA-Telex AO
Procedure:	With every departure at ZRH Airport, the calculated TSAT is sent to airport partners via AIMS and to NMOC. This takes place at TOBT -40 minutes. The number of TOBT entries is not limited.		

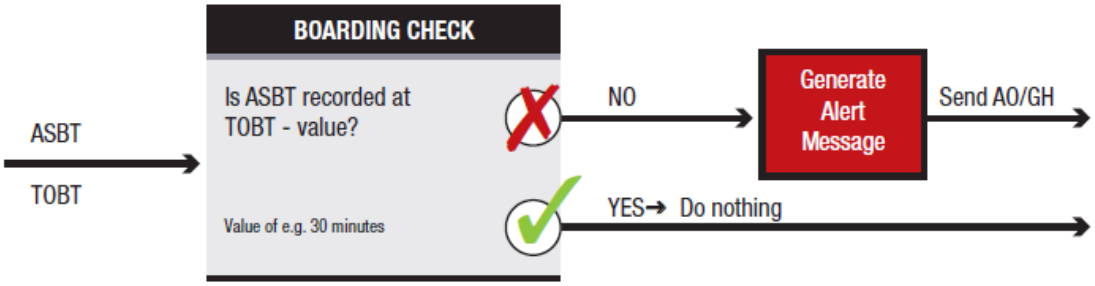
4.9. Milestone 11 – Boarding started

➔ Note that Milestone 11 is not implemented at ZRH Airport

Objective

First step: to inform all relevant A-CDM partners of ASBT.

Second step: to check whether the number of TOBT updates exceeds a tolerance defined locally, after TSAT has been issued.



Description

Inform of ASBT when it occurs. At a certain time before TOBT (local variable e.g. corresponding to aircraft type) a check is recommended to be performed to check the boarding status.

Input

The boarding status [yes, no] or ASBT and TOBT.

Process

ASBT is recorded in the A-CDM platform once passengers are boarding the plane. The AO/GH will be alerted that boarding has not commenced at a time (local variable) prior to TOBT and therefore the TOBT may not be respected.

Output

An alert message is recommended to be generated to the AO/GH, or no action in case boarding proceeds as planned.

Response to alert messages – AO/GH

Update TOBT if required.

Consequences of no action following alert messages

The flight may risk violation of the TOBT and not be ready at TSAT.

4.9.1. **Implementation of Milestone 11 at ZRH Airport**

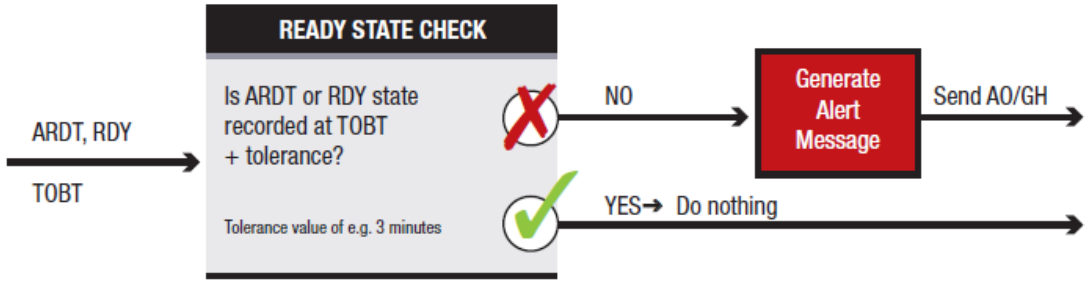
Item	**Trigger Event**	**Data Source**	**Alerts**
Recording of actual start boarding time	Start boarding	none	none
Procedure:	Milestone 11 is not implemented at ZRH Airport. The status “Boarding started” is not a reliable indication of any delay and therefore not used in the A-CDM process. It is, however, available and displayed in AIMS.		

4.10. Milestone 12 – Aircraft ready

Objective

First step: to inform all relevant A-CDM partners of ARDT in the A-CDM platform and that the aircraft is ready for start-up/pushback.

Second step: to inform the AO/GH that TOBT has passed and the A-CDM platform has not yet received ARDT or RDY Status.



Description

Inform of ARDT or RDY confirming that the flight follows the indicated TOBT. At TOBT + tolerance the AO/GH are informed that TOBT has passed and there has not been a ready status message yet.

Input

TOBT, ARDT or Aircraft RDY status from local process (e.g. flight crew or ATC automation).

Process

Aircraft ready status RDY or ARDT is recorded in the A-CDM platform (possibly via related systems like TWR FDPS, Pre-Departure Sequencer, AO, etc.). At TOBT + tolerance an alert to the AO/GH is recommended to be generated when such status or ARDT is not received.

Output

Inform the aircraft ready status to Clearance Delivery and other partners. An alert to the AO/GH is recommended to be generated when such status or ARDT is not received.

Consequences of no action following alert messages

To be defined locally.

4.10.1. Implementation of Milestone 12 at ZRH Airport

Item	Trigger Event	Data Source	Alerts
Aircraft ready	ARDT	CLE (AIMS)	none
Procedure:	Every departure at ZRH Airport is expected to be ready at TOBT +/-5 minutes according the definition in chapter 3.4.1.		

	This Milestone is combined with Milestone 13 “Start-up request”. The particular time “Transfer to APRON” is registered in the systems. If the flight is not ready within the timeframe, the TSAT in AIMS will be deleted. On the DGS, the wording “TOBT expired” will be displayed.

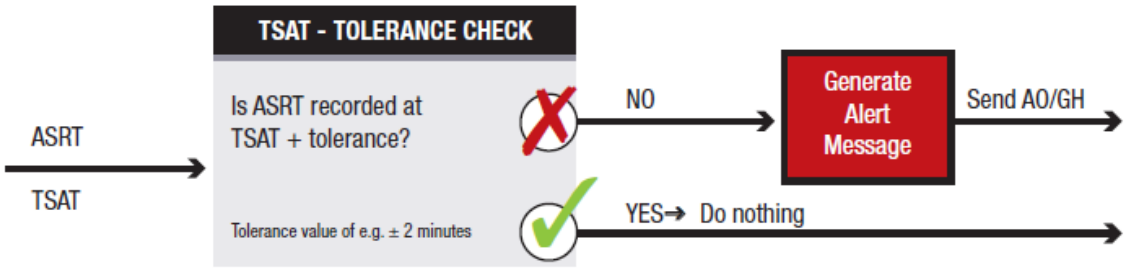
4.11. Milestone 13 – Start-up requested

➔ Note that Milestone 13 is not implemented at ZRH Airport

Objective

First step: to inform all relevant A-CDM partners of ASRT in the A-CDM platform.

Second step: to alert all relevant A-CDM partners when no start-up has been requested inside the locally agreed TSAT tolerance window.



Description

Inform of ASRT when it occurs. If the start-up request is not made by TSAT + tolerance, the AO/GH is informed that no start-up has been requested, and is recommended to update TOBT.

Input

ASRT and TSAT + tolerance.

Process

ASRT is recorded in the A-CDM platform after the request for start-up is made. At TSAT + tolerance a check is made to detect if the request for start-up is missing.

Output

Output is an indication to Clearance Delivery that TSAT has passed and it is recommended to generate an alert message to the AO/GH, or no action in case start-up request has been made as planned.

Response to alert messages – AO/GH

Update of TOBT.

Consequences of no action following alert messages

A C-DPI recommended to be sent to Network Operations if the flight is removed from the pre-departure sequence and the TOBT is deleted.

4.11.1. **Implementation of Milestone 13 at ZRH Airport**

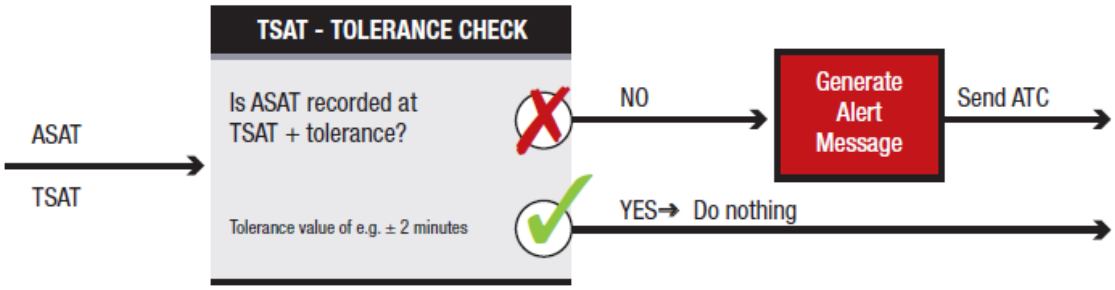
Item	**Trigger Event**	**Data Source**	**Alerts**
Start-up request	Start-up request	none	none
Procedure:	Milestone 13 is not implemented at ZRH Airport. This subject is already handled with Milestone 12 „Aircraft ready“. There is no additional crew start-up request required. APRON issues the start-up clearance to the crew according the calculated TSAT.		

4.12. Milestone 14 – Start-up approved

Objective

First step: to inform all relevant A-CDM partners of ASAT in the A-CDM platform and that the aircraft has received start-up approval/pushback clearance.

Second step: to check if ASAT is in accordance to TSAT and to alert all relevant A-CDM partners when no start-up has been granted.



Description

Inform of ASAT when it occurs. In case the start-up approval is not granted at TSAT + tolerance, all relevant partners are recommended to be informed. The flight will be re-sequenced.

Input

ASAT and TSAT + tolerance.

Process

ASAT is recorded in the A-CDM platform after the clearance for start-up is made. At TSAT + tolerance a check is made to detect if the clearance for start-up is missing.

Output

ASAT is recorded in the A-CDM platform and distributed, or an alert message is recommended to be sent to all relevant partners.

Response to alert messages – ATC

ATC is recommended to provide start-up approval or flight is recommended to be re-sequenced to assign new TSAT.

Consequences of no action following alert messages

Not applicable.

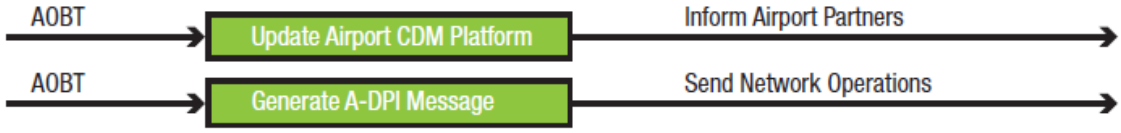
4.12.1. **Implementation of Milestone 14 at ZRH Airport**

Item	Trigger Event	Data Source	Alerts
Start-up approval	Actual start-up	ASAT (darts) SUT (AIMS)	none
Procedure:	At ZRH Airport, the departure will be released for start-up and/or pushback by APRON around TSAT. If operational aspects require an earlier off-block, the tolerance can be increased. Exceptions are always possible. The time, where start-up is given, is tracked in the systems. If the departure is not ready for pushback or start-up at TSAT +6 minutes when APRON calls, the flight will be taken out of the departure planning and moved into standby by APRON. With this action, the TSAT will be deleted in the systems and on the DGS. Flight Crew will be advised to contact Delivery again.		

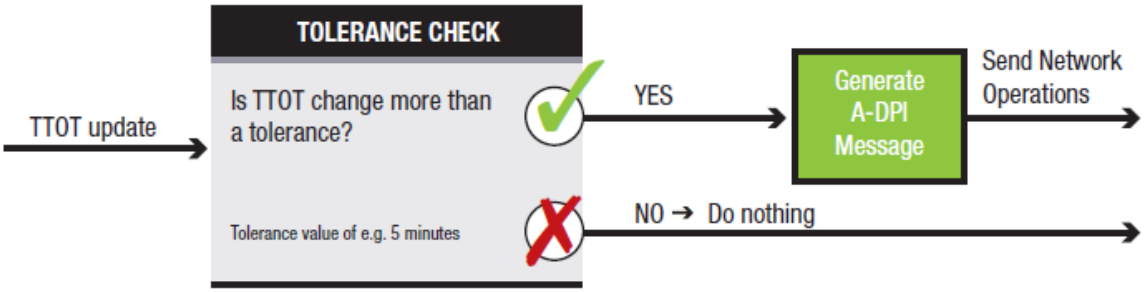
4.13. **Milestone 15 – Off-block**

Objective

First step: to inform all relevant A-CDM partners of AOBT in the A-CDM platform and that the aircraft has commenced pushback/taxi from parking position.



Second step: to check if TTOT changes by more than the agreed tolerance and inform Network Operations.



Description

Inform of AOBT when it occurs. AOBT always triggers an A-DPI message to Network Operations or in the case of remote holding at a defined time prior to TTOT. After a first A-DPI is sent this check is highly recommended to be performed to check TTOT updates against the TTOT tolerance before Network Operations is informed, with a new A-DPI, of the updated TTOT.

Input

AOBT is detected and input into the A-CDM platform. TTOT is calculated from AOBT + EXOT automatically.

Process

AOBT is recorded in the A-CDM platform after pushback is detected. A-DPI is highly recommended to be generated and sent to the Network Operations. Any subsequent update of TTOT is highly recommended to be checked against the TTOT tolerance to determine whether a new A-DPI shall be sent to the Network Operations.

Output

A-DPI message is always sent to Network Operations and subsequent A-DPI is sent when the TTOT changes by more than the TTOT tolerance.

Response to alert messages – Network Operations

Freeze CTOT.

Consequences of no action following alert messages

Not applicable.

4.13.1. **Implementation of Milestone 15 at ZRH Airport**

Item	Trigger Event	Data Source	Alerts
Actual off-block	AOBT	AOBT (darts) ATD (AIMS)	none
Procedure:	At ZRH Airport, the taxi clearance on open stands is registered as off-block message in the system. At gate stands, the pushback is registered as off-block message in the system. In both cases, an A-DPI message is generated and sent to NMOC. If it is required to remotely position an outbound flight due to a bad slot and stand shortage, the creation of a move strip from the stand to the remote position is required in the system. Therefore it is assured, that no false pushback/start-up or begin taxi time is entered into the system and sent to NMOC. The normal start-up procedure applies at the remote position when TSAT is reached.		

4.14. Milestone 16 – Take-off

Objective

To inform all relevant A-CDM partners about the actual take-off.

Description

An airborne message is generated and the flight is removed from the departure sequence.

Input

ATOT.

Process

Generate airborne status.

Output

Airport partners are informed with an airborne message.

Consequences of no action following alert messages

Not applicable.

4.14.1. Implementation of Milestone 16 at ZRH Airport

Item	Trigger Event	Data Source	Alerts
Airborne status	ABT	ABT (AIMS)	none
Procedure:	At ZRH Airport, the take-off time is stored in the system and sent to NMOC.		

5. Adverse Conditions at ZRH Airport

Many different events, both planned and unplanned, can disrupt the normal operation of an airport and reduce its capacity to levels substantially below that of normal operations. Such events are adverse conditions.

EUROCONTROL defines an adverse condition as “a situation in which the airside and or land-side conditions at an airport are such that capacity falls and the airport partners need to use specially designed procedures to minimize operational costs and utilize the available capacity efficiently”.

Following some examples of adverse conditions:

- De-icing
- Thunderstorms
- Wind
- Snow
- Accident/Incident
- Handling/Fueling stop
- Construction/Maintenance work

The aim of A-CDM is to manage these situations more efficiently in order to utilize the remaining capacity efficiently and to recover any available capacity in the shortest time possible.

5.1. De-icing

Although de-icing may be seen as part of winter operations, its significant impact on airport capacity qualifies it to be treated under adverse conditions.

5.1.1. De-icing status

At ZRH Airport, three different de-icing status are defined:

“De-icing on request”

- less than 50% of traffic is expected for de-icing
- this value is generally valid all year, especially from 1. October until 30. April
- Flight Crews have to request de-icing according AIP
- ATC Slot adherence is a must

“General de-icing"

- more than 50% of traffic is expected for de-icing
- published on AIMS headerline
- Flight Crews have to request de-icing according AIP
- ATC slot adherence is a must

“General de-icing with extended Slot Tolerance Window”

- ATC slot adherence is no longer assured due to long de-icing times, RWY cleaning, or other reasons
- ATC slot tolerance window can be increased up to max +/-30 minutes (CTOT, decision on behalf of Snow Commitee, in coordination with FMP/NMOC)
- Published on AIMS headerline
- Flight Crews have to request de-icing according AIP
- ATC slot adherence (within extended STW) is a must

5.1.2. DPI Messages during de-icing conditions

The de-icing status as well as de-icing process time is contained in the DPI sent to NMOC.

During status “De-icing on request”, as soon as the de-icing request is made by the Flight Crew, the process status and process time (e.g. de-icing duration according table) are contained in the DPI messages.

During “General de-icing" as well as “General de-icing with extended STW”, all flights are considered to be de-iced in the DPI messages, although a de-icing request is not yet made. If the Flight Crew does not request de-icing until 15 minutes prior SOBT/TOBT latest, the de-icing remark in the message is cancelled and the flight is indicated as a non-de-icing flight in the DPI message.

5.1.3. Factors contributing to smooth de-icing operation

5.1.3.1. Flight Crew

- Request de-icing as early as possible!
  Early de-icing requests contribute to a steady de-icing planning and therefore help to allocate de-icing resources in an optimized way. A late request may cause additional start-up delay for the flight.
  - ➔ Note that de-icing has to be requested 15 minutes prior SOBT/TOBT latest according AIP
  - ➔ Note that de-icing for the 6th outbound wave has to be requested 30 minutes prior SOBT/TOBT latest
- State early, when a non-standard RWY for departure is required!
  This has a major impact on the departure (and de-icing) planning process and therefore, an early indication helps to ease the planning.
- Aircraft ready
  Report ‘aircraft ready’ within the TOBT window of +/- 5 minutes according chapter 3.4.1 but before the actual beginning of the de-icing process.

5.1.3.2. Ground Handler/Aircraft Operator

- Accurate TOBT Management
  Set TOBTs as early and accurate as possible, especially during de-icing. An accumulation of TOBTs at the same period should be avoided whenever possible.

5.1.3.3. De-icing Provider

- Declaration of overall de-icing trucks available
- Declaration of overall remote de-icing lanes in operation and timely open these resources
- Immediate, adequate clearing of de-icing lane (when the de-icing trucks are in safe position)
  This contributes to an optimized deicing planning. As long as the deicing lane is not clear, no aircraft will be feed into the de-icing lane, which directly affects the TSAT/TTOT of the next flights.
- Truck refueling
  Enter/update de-icing truck refueling time as early and as accurate as possible so that the de-icing tool and the departure management system can take it into account for the planning process.
- On-stand de-icing
  Update de-icing relevant process times early and accurate. This includes de-icing start time, de-icing end time or an early allocation of the de-icing truck to a flight foreseen for on-stand de-icing.

➔ Note that the de-icing end time (DAE) should be set immediately after the de-icing process has finished. Otherwise, a warning will be displayed at APRON when issuing start-up clearance and no DAE is set. This leads to avoidable discussions on the frequency. Furthermore, the de-icing resource (Truck) is still blocked for the planning process leading to later TSATs than necessary for other flights with de-icing.

5.1.3.4. **De-icing Coordination**

- Adequate feed of needed deicing status for most correct calculation of the process times needed resources and therefore TSAT and TTOT calculation.

5.1.3.5. **Apron Control**

- Early allocation of non-standard de-icing pad
  If the intention exists to guide a flight to a non-standard de-icing pad (e.g. pad F for a departure planned for RWY28) then this manual allocation in the de-icing tool should be done as early as possible.

5.1.3.6. **Clearance Delivery**

- Transfer to APRON
  Transfer ready departures to APRON within the TOBT window of +/- 5 minutes, regardless if the flight is going to be de-iced on stand or on the pad.

5.2. Handling/Fueling Stop

A handling/fueling stop can be triggered for the following reasons (list not complete):

- lightning strike
- wind

The Airport Authority (AA) at ZRH Airport is responsible for activating the handling/fueling stop. All GHs are responsible for ensuring that the stop is carried out by their employees. Once the hazard has been reduced, AA cancels the handling/fueling stop again.

6. TOBT Management at ZRH Airport

6.1. TOBT Management during normal OPS

6.1.1. Manual TOBT Management

During normal operations, the GH or the responsible for the TOBT management has to provide accurate TOBTs until the turnaround process is completely finished. If the TOBT is set to a later time than actually needed, it can be corrected and it will be considered in the further departure planning. There is no limit in updates of TOBTs. TOBTs must be set in a forward-looking way, otherwise the overall planning result and TSAT stability will have qualitative loss.

All kind of ETDs (SEDs or PEDs) are considered as TOBT and sent via DPI Message to NMOC.

6.1.2. Automatic TOBT Management

At ZRH Airport, an automated TOBT management is implemented. This means:

- At the time, when the Flight Crew receives the ATC clearance, the TSAT resulting from darts at that time will be automatically taken as SED and PED in AIMS and may generate a delay movement message if a certain tolerance is exceeded.

- During on-stand de-icing, the automatic TOBT process starts at the time, when the de-icing truck starts to deice (ACZT). This means that manual TOBTs only have to be set until the turnaround process (without de-icing!) is finished.

6.2. TOBT Management during Adverse Conditions

6.2.1. TOBT Management during/after interruption of OPS

In case of severe thunderstorms/lightning/heavy rain etc., a handling and fueling stop may be declared by the airport concerning all GHs. As a result, all handling activities are abandoned for an unknown period of time. To start after handling and fueling stop it is the responsibility of the GH/AO to update the TOBT in order to indicate the end of the turnaround process. Therefore, every flight needs a TOBT assigned. This is also valid for flights which, at the time the OPS started again, had their regular off-block.

➔ Note that an accumulation of TOBTs creates start-up delays.

If a GH declares an internal handling/fueling stop, it is his responsibility to set TOBTs for all of his flights.

6.2.2. TOBT Management during Winter OPS

During Winter OPS the normal TOBT Management must be applied.

6.2.3. TOBT Management/TSAT generation for flights with on-stand de-icing

The TOBT has to be set or updated until the handling process is completed and does not include any de-icing time! The de-icing tool together with the darts system calculates the TSAT respecting any de-icing related factors.

The following events are used to update the TSAT according the actual situation:

- Declaration of the overall availability of de-icing trucks
- Allocation of the de-icing truck to a flight by the responsible de-icing coordinator
- The actual start time of the de-icing process (normally when truck begins to spray)
- The actual end time of the de-icing process (normally when truck has finished spraying/is in safe position)

7. Advice Time at ZRH Airport

The Advice Time (Staff/Public Advice time SAD/PAD) in terms of A-CDM is used to indicate that the CDM process is interrupted and there is no precise information regarding the end turnaround process available. With an input of an Advice Time, the flight will be completely taken out of the departure planning process, when:

- the flight is considered in the departure planning process (45 minutes prior SOBT/ETD) for the first time AND an Advice Time (regardless of time value) is already set
- the flight is already in the departure planning process and an Advice Time is set (regardless of time value)

In both cases, the flight is taken out of the departure sequence and is moved automatically in the standby window. After 10 minutes in standby, a C-DPI is triggered. The system does NOT use the time value contained in the Advice Time. It only checks if an advice time is set or not.

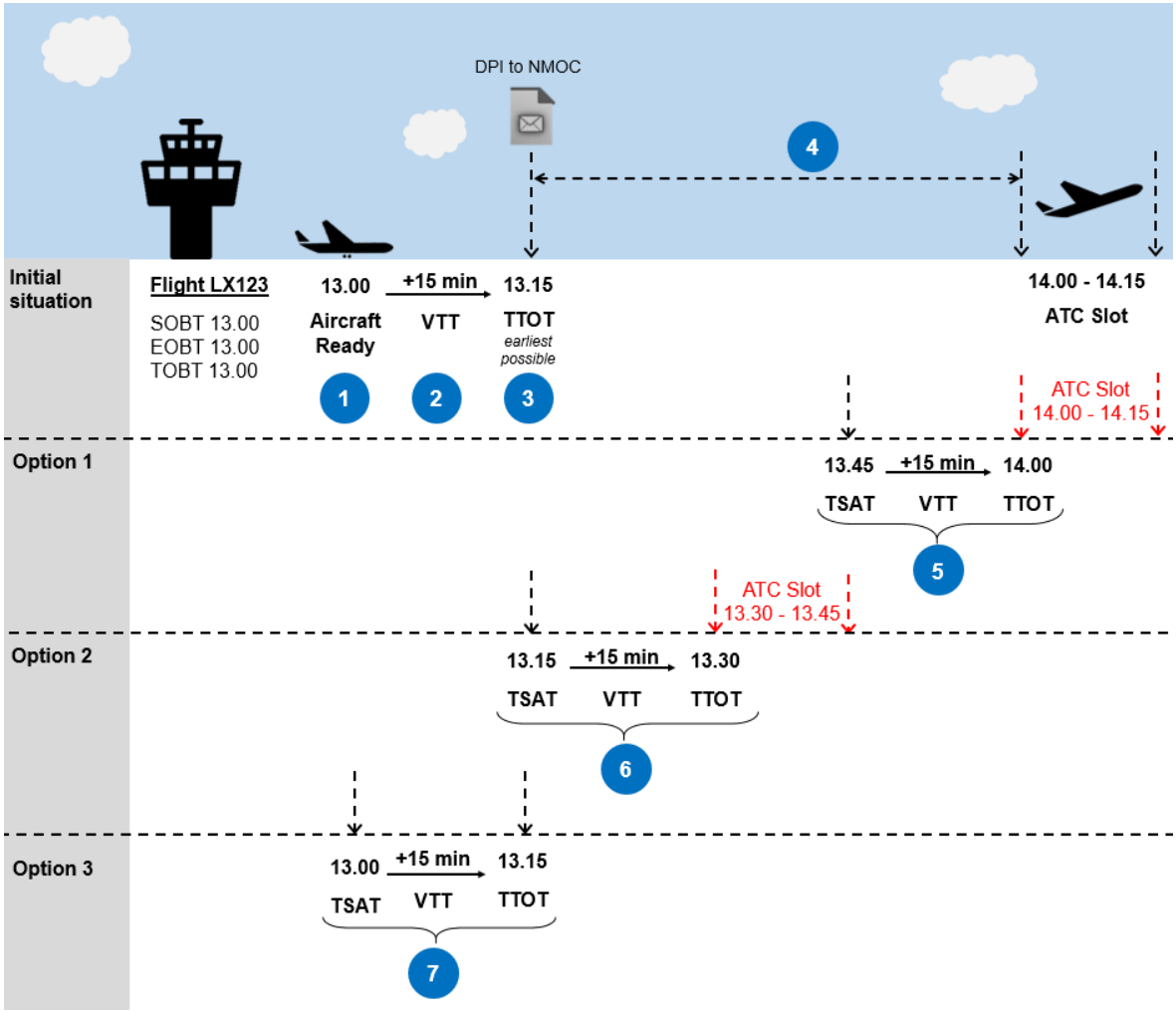
➔ Note that for Swiss a different procedure is applied.
➔ Note that this applies for regulated and non-regulated flights the same way.

8. REA message for regulated flights at ZRH Airport

One of the benefits of A-CDM is the transparency to NMOC. Therefore, a manual sent REA-message is no longer necessary. With the provision of DPI messages, the status of a flight is always transmitted and therefore known by NMOC.

Here is an example of the flight LX123 with the following key points:

- ➔ SOBT / EOBT / TOBT 13.00
- ➔ ATC Slot 14.00 - 14.15
- ➔ ARDT 13.00
- ➔ VTT 15 minutes



Initial situation:	
1	LX123 is fully ready at 13.00
2	The VTT of LX123 is 15 minutes to the designated RWY
3	The earliest possible TTOT of LX123 is at 13.15 ➔ At this point, a DPI message is sent to NMOC containing this TTOT.

4	Now, NMOC tries to improve the ATC slot to the earliest possible TTOT (13.15) at maximum in order to reduce the ground time of the flight ➔ NMOC has to assure that the slot should not be improved too much so that the flight is unable to meet the slot. As long as no improvements from NMOC arrive, the flight will still be calculated in the airport systems respecting the actual ATFM regulation (ATC Slot 14.00 – 14.15).

Now there are three options:

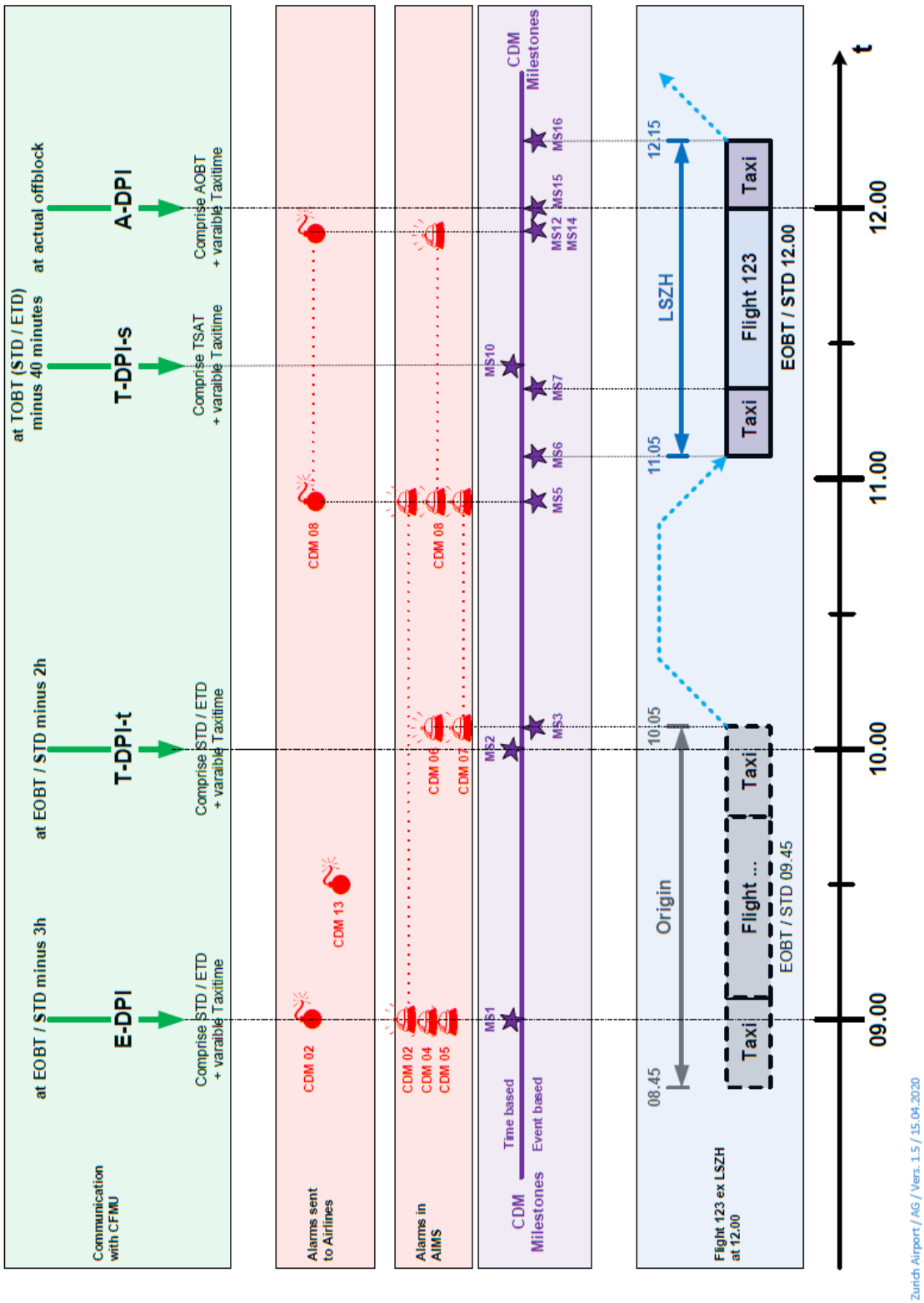
Option 1:	
5	NMOC is not able to improve the ATC slot. The original slot from 14.00 to 14.15 remains. ➔ ATC slot 14.00 - 14.15 ➔ TSAT 13.45 ➔ TTOT 14.00
Option 2:	
6	NMOC is able to improve the ATC slot by 30 minutes. NMOC assigns to LX123 the slot from 13.30 to 13.45. ➔ New ATC slot 13.30 - 13.45 ➔ TSAT 13.15 ➔ TTOT 13.30
Option 3:	
7	Slot cancellation – the departure is optimized to the TTOT send in the latest DPI ➔ TSAT 13.00 ➔ TTOT 13.15

This process works as well, when the GH starts boarding late and sets a TOBT to e.g. 13.20. When then the ATC CLR is received, NMOC will try to improve the ATC slot according to the new calculated TTOT (13.20 + 15 min=13.35).

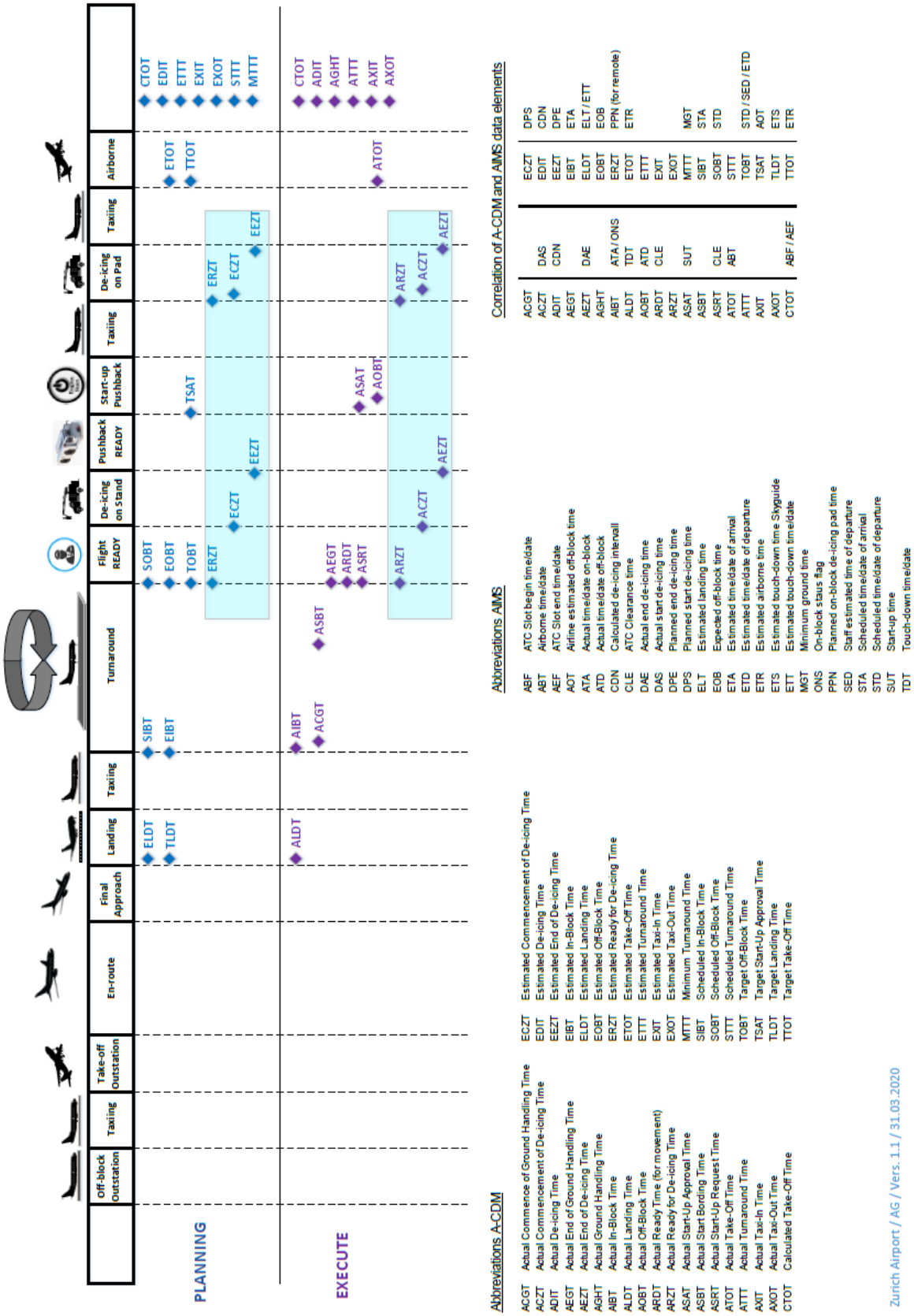
➔ Note: When setting a TOBT, which exceeds EOBT by more than 15 minutes, an alarm (CDM08) will be sent to the AO.

9. Appendix

9.1. Graphic of the DPI Messages/CDM Milestones/CDM Alerts at ZRH Airport



9.2. Summary – A-CDM workflow and abbreviations



Abbreviations A-CDM

ACGT	Actual Commence of Ground Handling Time	ECZT	Estimated Commencement of De-icing Time
ACZT	Actual Commencement of De-icing Time	EDIT	Estimated De-icing Time
ADIT	Actual De-icing Time	EEZT	Estimated End of De-icing Time
AEGT	Actual End of Ground Handling Time	EIBT	Estimated In-Block Time
AEZT	Actual End of De-icing Time	ELDT	Estimated Landing Time
AGHT	Actual Ground Handling Time	EOBT	Estimated Off-Block Time
AIBT	Actual In-Block Time	ERZT	Estimated Ready for De-icing Time
ALDT	Actual Landing Time	ETOT	Estimated Take-Off Time
AOBT	Actual Off-Block Time	ETTT	Estimated Turnaround Time
ARDT	Actual Ready Time (for movement)	EXIT	Estimated Taxi-In Time
ARZT	Actual Ready for De-icing Time	EXOT	Estimated Taxi-Out Time
ASAT	Actual Start-Up Approval Time	MTTT	Minimum Tumaround Time
ASBT	Actual Start Bording Time	SIBT	Scheduled In-Block Time
ASRT	Actual Start-Up Request Time	SOBT	Scheduled Off-Block Time
ATOT	Actual Take-Off Time	STTT	Scheduled Turnaround Time
ATTT	Actual Turnaround Time	TOBT	Target Off-Block Time
AXIT	Actual Taxi-In Time	TSAT	Target Start-Up Approval Time
AXOT	Actual Taxi-Out Time	TLDT	Target Landing Time
CTOT	Calculated Take-Off Time	TTOT	Target Take-Off Time

Abbreviations AIMS

ABF	ATC Slot begin time/date	ACGT	EZCT
ABT	Airborne time/date	ACZT	EDIT
AEF	ATC Slot end time/date	ADIT	EEZT
AOT	Airline estimated off-block time	AEGT	EIBT
ATA	Actual time/date on-block	AEZT	ELDT
ATD	Actual time/date off-block	AGHT	EOBT
CDN	Calculated de-icing intervall	AIBT	ERZT
CLE	ATC Clearance time	ALDT	ETOT
DAE	Actual end de-icing time	AOBT	ETTT
DAS	Actual start de-icing time	ARDT	EXIT
DPE	Planned end de-icing time	ARZT	EXOT
DPS	Planned start de-icing time	ASAT	MTTT
ELT	Estimated landing time	ASBT	SIBT
EOB	Expected off-block time	ASRT	SOBT
ETA	Estimated time/date of arrival	ATOT	STTT
ETD	Estimated time/date of departure	ATTT	TOBT
ETR	Estimated airborne time	AXIT	TSAT
ETS	Estimated touch-down time Skyguide	AXOT	TLDT
ETT	Estimated touch-down time/date	CTOT	TTOT
MGT	Minimum ground time		
ONS	On-block staus flag		
PPN	Planned on-block de-icing pad time		
SED	Staff estimated time of departure		
STA	Scheduled time/date of arrival		
STD	Scheduled time/date of departure		
SUT	Start-up time		
TDT	Touch-down time/date		

Correlation of A-CDM and AIMS data elements

ACGT	DAS	EZCT	DPS
ACZT	CDN	EDIT	CDN
ADIT		EEZT	DPE
AEGT	DAE	EIBT	ETA
AEZT		ELDT	ELT / ETT
AGHT		EOBT	EOB
AIBT	ATA / ONS	ERZT	PPN (for remote)
ALDT	TDT	ETOT	ETR
AOBT	ATD	ETTT	
ARDT	CLE	EXIT	
ARZT		EXOT	
ASAT	SUT	MTTT	MGT
ASBT		SIBT	STA
ASRT	CLE	SOBT	STD
ATOT	ABT	STTT	
ATTT		TOBT	STD / SED / ETD
AXIT		TSAT	AOT
AXOT		TLDT	ETS
CTOT	ABF / AEF	TTOT	ETR

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