ATD-2 Update for TBFM/TFDM Ops Teams

June 26, 2019
Overview

Demo

Q&A
Field Demo structured in 3 year-long phases with increasing IADS system capabilities.
Recap of New Capabilities for Phase 2

Integrated Arrival, Departure, Surface (IADS) System v4.0
deployed: September 11th

1. Extend time horizon to strategic range (enables more options for operators and passengers).
   start date: October 10th

2. Interface with Atlanta Center arrival metering TBFM system (enables evaluation of pre-scheduling concept)
   start date: October 1st

3. Interface with Tower controller electronic flight strips. (enables more precise management of controlled takeoff times)
   start date: September 20th

4. Deliver IADS data as TFDM Terminal Publication (TTP) service via FAA’s SWIM system (enables all flight operators to participate in ATD-2 Field Demo)
   start date: July 6th

5. Ingest data from TTP-connected Mobile App data into IADS scheduling system (enables General Aviation operators to fully participate in ATD-2 Field Demo)
   start date: late-October
Overhead Stream From CLT into Busy NEC

TBFM meter point to Potomac airports

TBFM meter point to NY airports

Frequent Sector Capacity Challenges

ZTL/ZDC Boundary
Pre-Scheduling with EOBTs from CLT to ATL (Started Oct 2018)

1. At an adaptable time prior to departure (e.g., 20 min) the ATD-2 system uses the EOBT, taxi time estimate and a buffer to electronically submit a release time request to TBFM.

2. Center TMC approves or adjusts the time based on center constraints.

3. ATCT and Ramp utilize the now visible APREQ time on their strips and pushback advisories.

4. IDAC-style scheduling between TBFM and ATD-2 is used to re-schedule as necessary.

The data is made available on the TTP SWIM feed so that Operators can get it to their pilots.
CLT APREQ Daily Compliance
(Compliance Improvement Since ATD-2 Start)

In addition to overall improved compliance into TBM systems, the predictability is increasing.

Steady increase of APREQ compliance over the life of the project. Reduced variation in compliance leading to improved predictability.
The most substantial APREQ compliance improvements started with Phase 2 capability (AEFS integration, ZTL IDAC, pre-scheduling and scheduler updates).
APREQ Delay For Pre-Scheduled Flights into KATL Have Been More Predictable For the Last Five Months

Substantial Improvements in predictability of delay for the last 5 months
Data Exchange between ATD-2 and TBFM

**TBHM**
- ETAs, STAs, Release Times
- APREQ Mode (Manual, Semi, Auto)
- Red-Green Space, Release Times
- Requested Release Times
- Departure Runways
- Predicted Take Off Times (has been deprecated)

**ATD-2**

**IDAC**

**SWIM**
Surface Metering – Process Flow

1. ATD-2 generates demand and capacity predictions

2. TMC enables metering capability and sets metering parameters in collaboration with ramp manager

3. ATD-2 recommends and TMC affirms SMPs.

4. Ramp controllers honor metering hold advisories
Prior to a release time being assigned,
- ATD-2 identifies the flight as being a part of an APREQ restriction
- ATD-2 computes an Earliest Feasible Takeoff Time (EFTT) that includes additional buffer (EFTT Buffer) to account for estimated pushback time uncertainty
  - 1 minute for flights with EOBT
  - 4 minutes for flights without EOBT

Once a release time has been assigned,
- ATD-2 assigns a TOBT and TMAT so as to get the flight to the runway shortly before the start of the release time window
  - CTD Buffer = 5 minutes

ATD-2 calibrated EFTT and CTD buffers through engagement with CLT ATCT and data analysis of release time compliance
- TFDM’s CTD buffer serves the roll of both the EFTT and CTD buffers in ATD-2
Benefits of Estimated Off Block Times for ATC and Operators

**EOBTs**  
Improved Predictions of Pushback Time

- **Improve Take Off Time Predictions**
- **Better Take Off Time Predictions**
- **Better Runway Load Balancing**
- **Improved Airport Throughput**
- **Improved On-Time Performance**
- **Improved Departure Fix Load Balancing**
- **More Targeted TMIs that Delay Less Flights**
- **Reduced Delay into Overhead Stream and Arrival Metering**
- **Reduced Fuel Burn**

- **Provide Confidence to Request Release Times Earlier**
- **More Targeted TMIs that Delay Less Flights**
- **Reduced Delay into Overhead Stream and Arrival Metering**
- **Reduced Fuel Burn**

- **Allow Operators to Identify Flights at Risk of Delay**
- **Better Operator Resource Utilization**
- **Better On-Time Performance And Reduced Fuel Burn**

EOBTs allow the NAS to operate more efficiently, reducing delays and fuel burn.
Analysis and Feedback on EOBTs

• NASA has analyzed EOBTs provided through SWIM for over two years and provided input/feedback to Operators
  – Some Operators have evolved their EOBT generation several times
  – Other Operators are submitting legacy times (LGTD/LTIMEs) on the new SWIM interface. However, these Operators are working toward more advanced EOBTs.
  – NASA does not share Operator specific performance data with the community. This honors the relationship with Operators and encourages engagement and progress.

• Quantifying EOBTs quality is a non-trivial task
  – Analysis of both absolute and actual error at various look ahead time windows
  – Proper selection of flights to exclude from this analysis (controlled flights, return to gate, etc.)
  – Sources of ‘truth data’ for actual OUT. EOBT is really more akin to ‘pilot call in’

• An ‘upper bound’ of accuracy for EOBTs does exist in the NAS today
  – The absolute best EOBTs today leverage passenger ticket scan and baggage information. This data does not become available until about 30 minutes prior to departure.
  – Predicting EOBT is akin to predicting when your computer will fail given the many components on the aircraft that could fail, passenger issues, crew staffing issues, etc.
Agenda

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Questions?