

Future Surface Decision Support Overview

Airspace Technology Demonstration 2 (ATD-2)
Industry Workshop

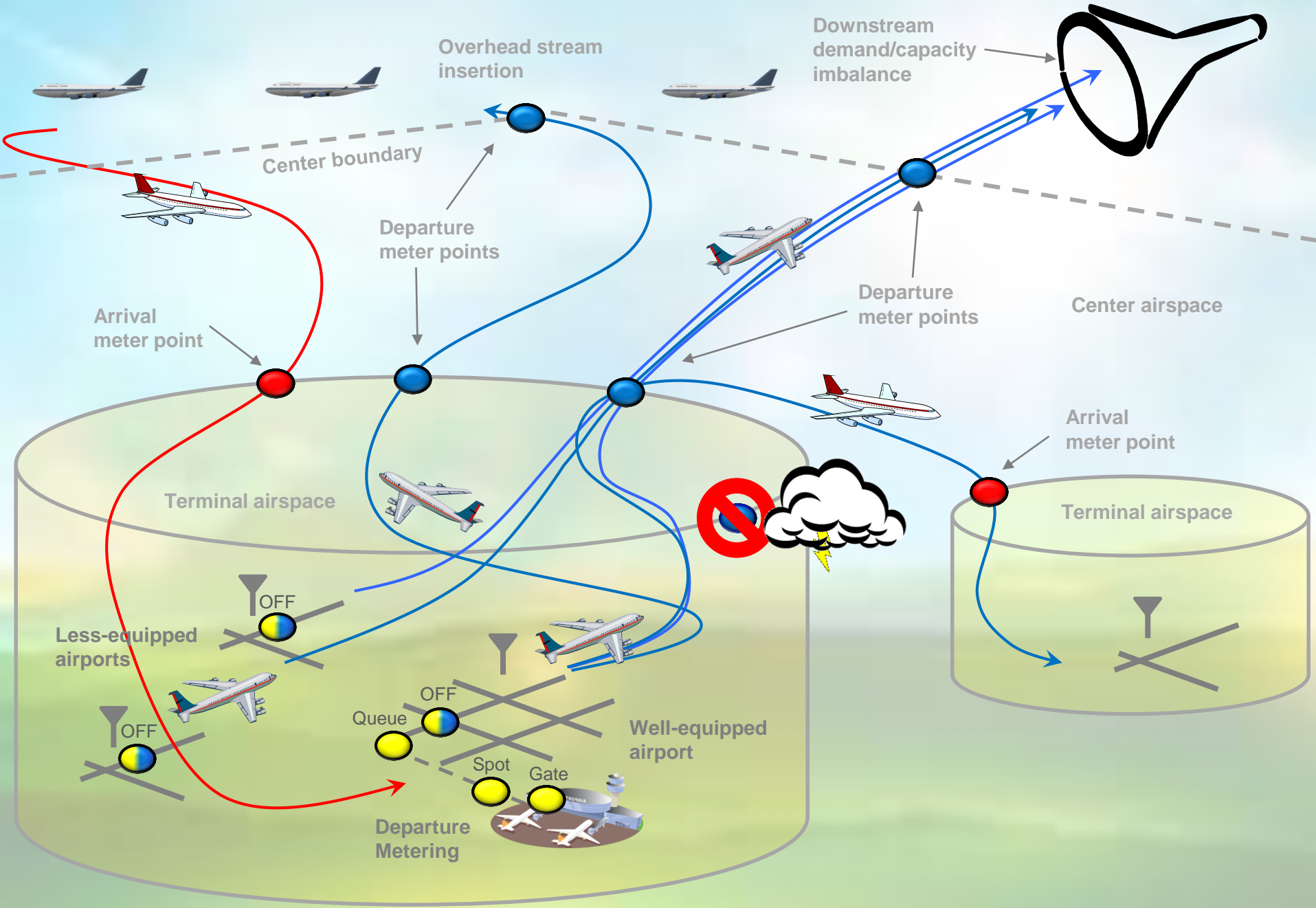
September 4, 2019

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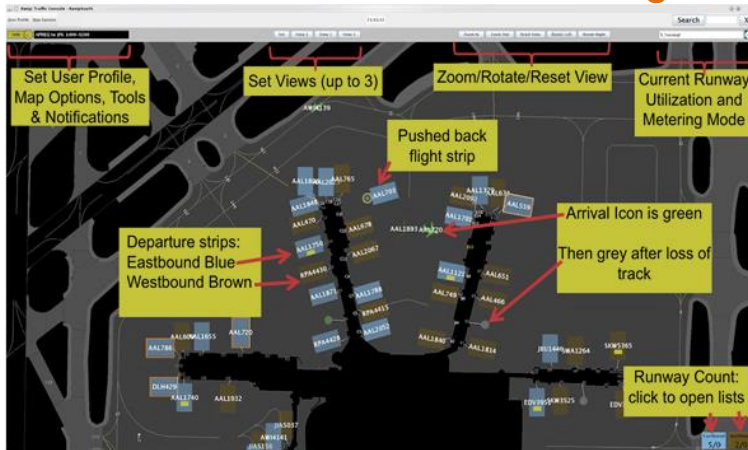
- ATD-2 Overview
- Electronic Data Exchange
- Common Situational Awareness
- Surface Scheduling
- Departure Scheduling for Overhead Stream Insertion
- Surface Metering

Operational Environment for the ATD-2 Concept



- NASA/FAA/Industry collaborative project that demonstrates the benefits of an integrated arrival, departure and surface (IADS) traffic flow decision making process while introducing new trajectory based operations (TBO) technologies and procedures
- Responds to a NextGen Advisory Committee (NAC) recommendation/need

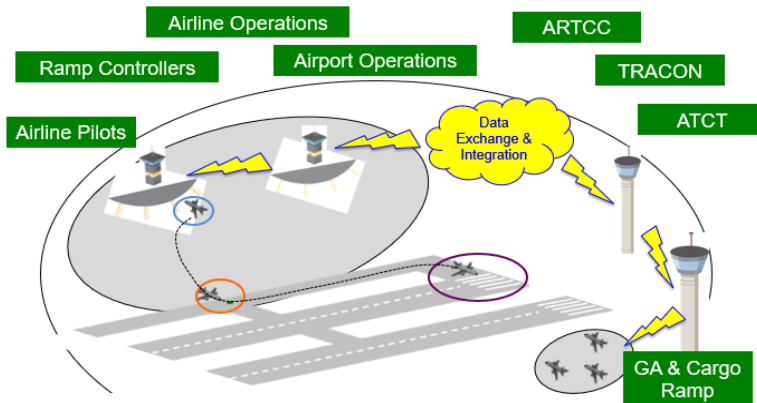
Collaborative Surface Metering



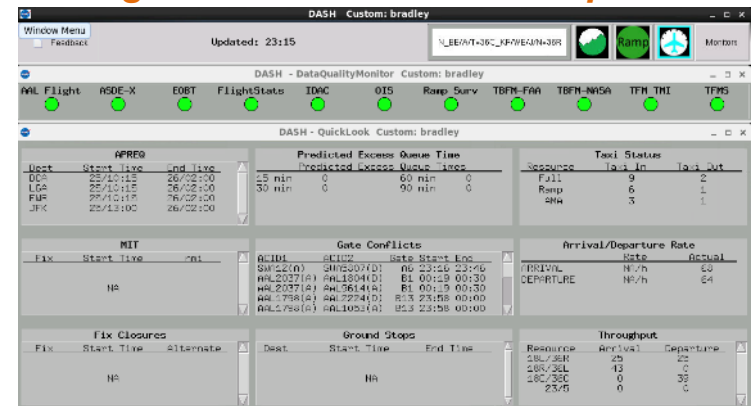
Overhead Stream Operational Integration

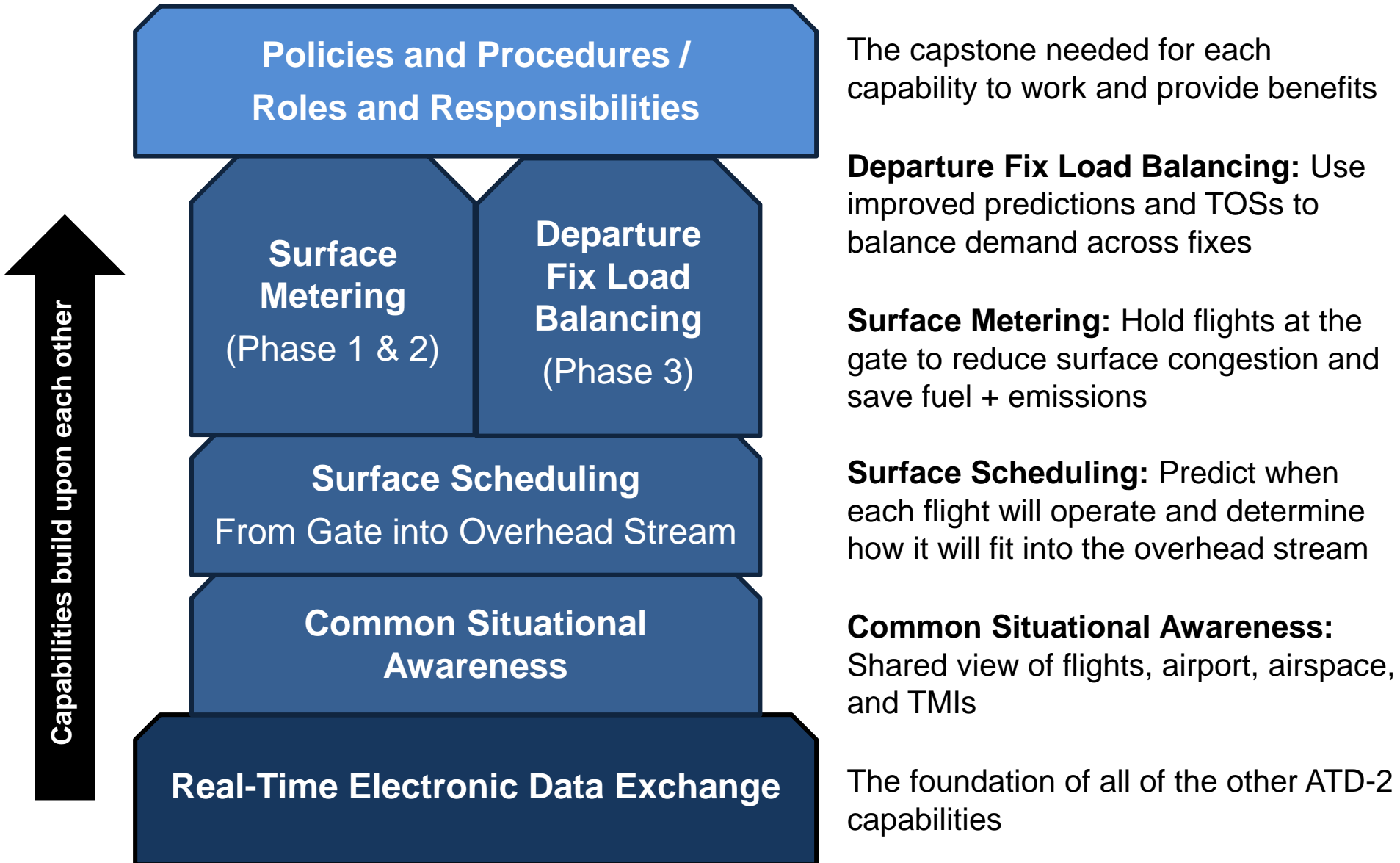


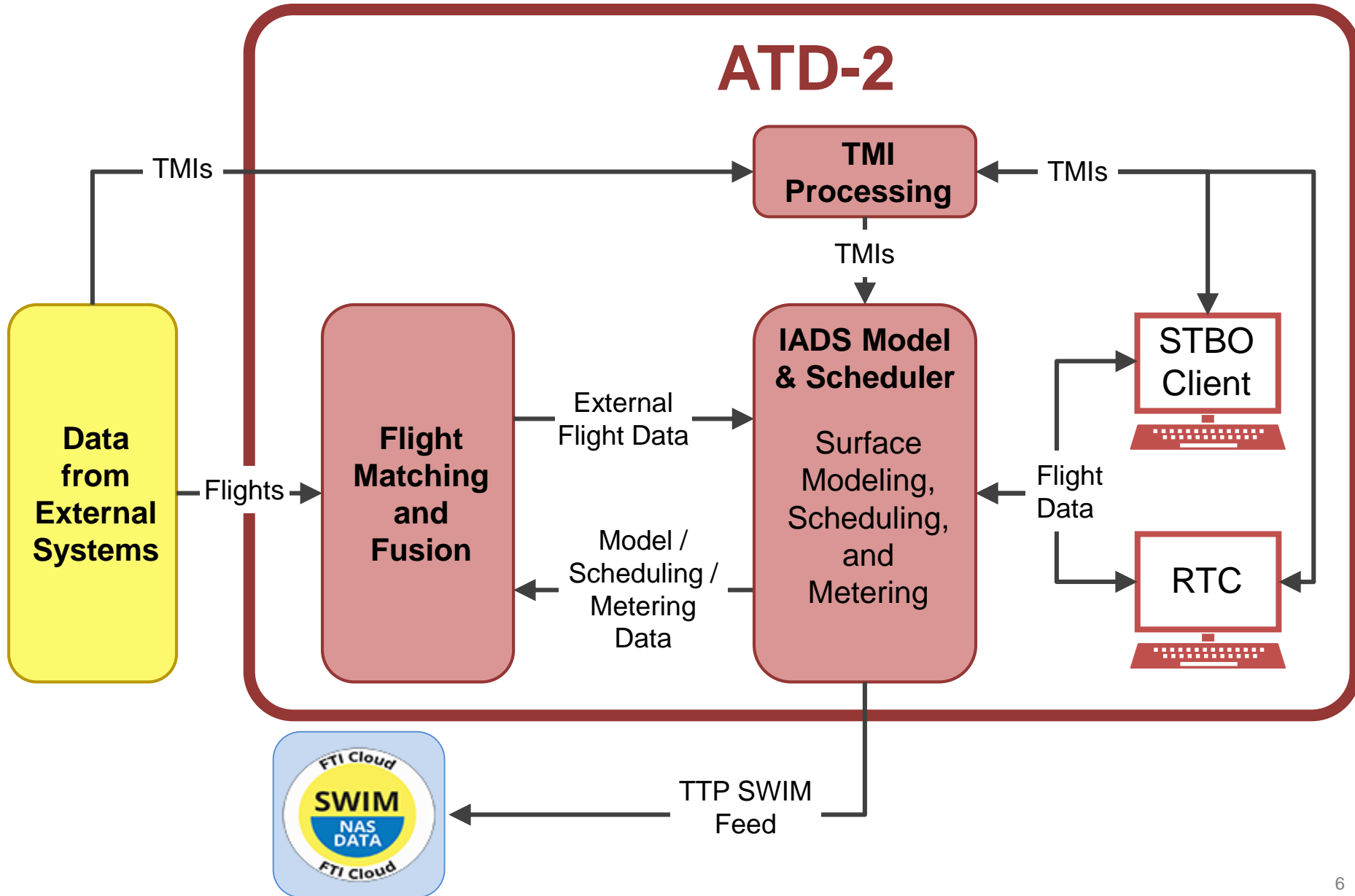
ATC/Operator Data Exchange and Integration



Initial Digital Transformation of Airport Surface

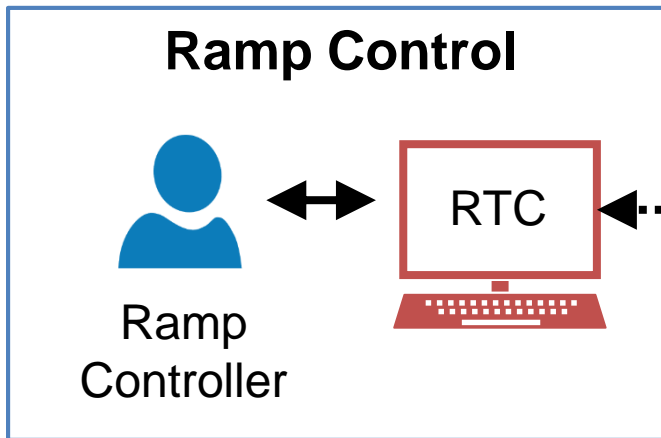
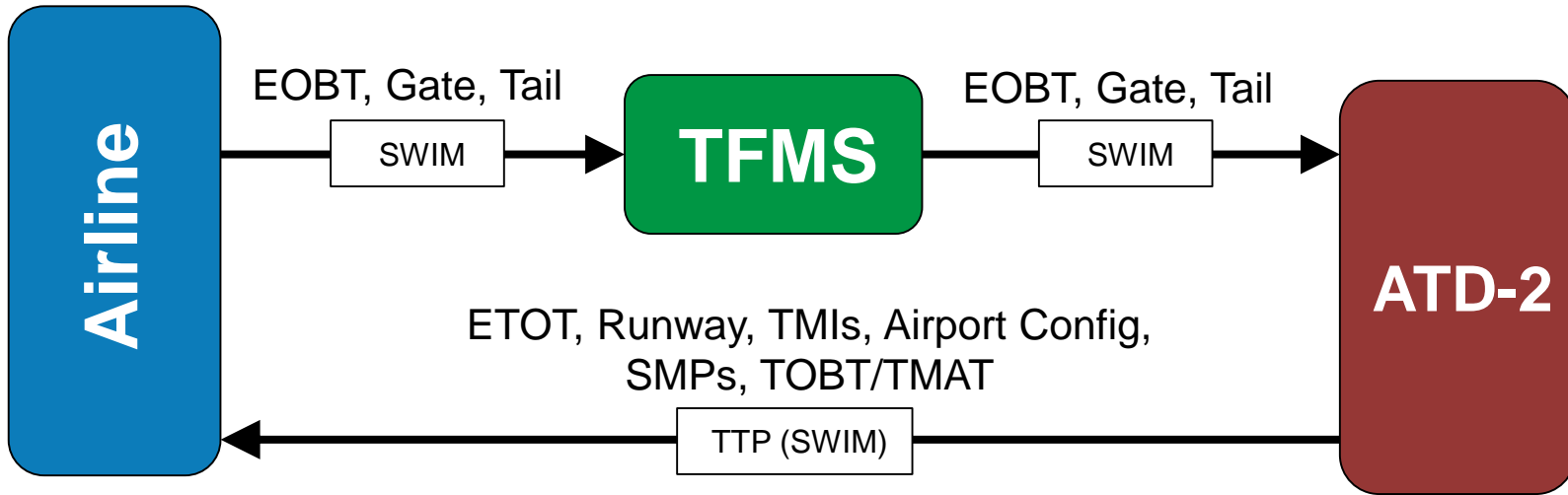






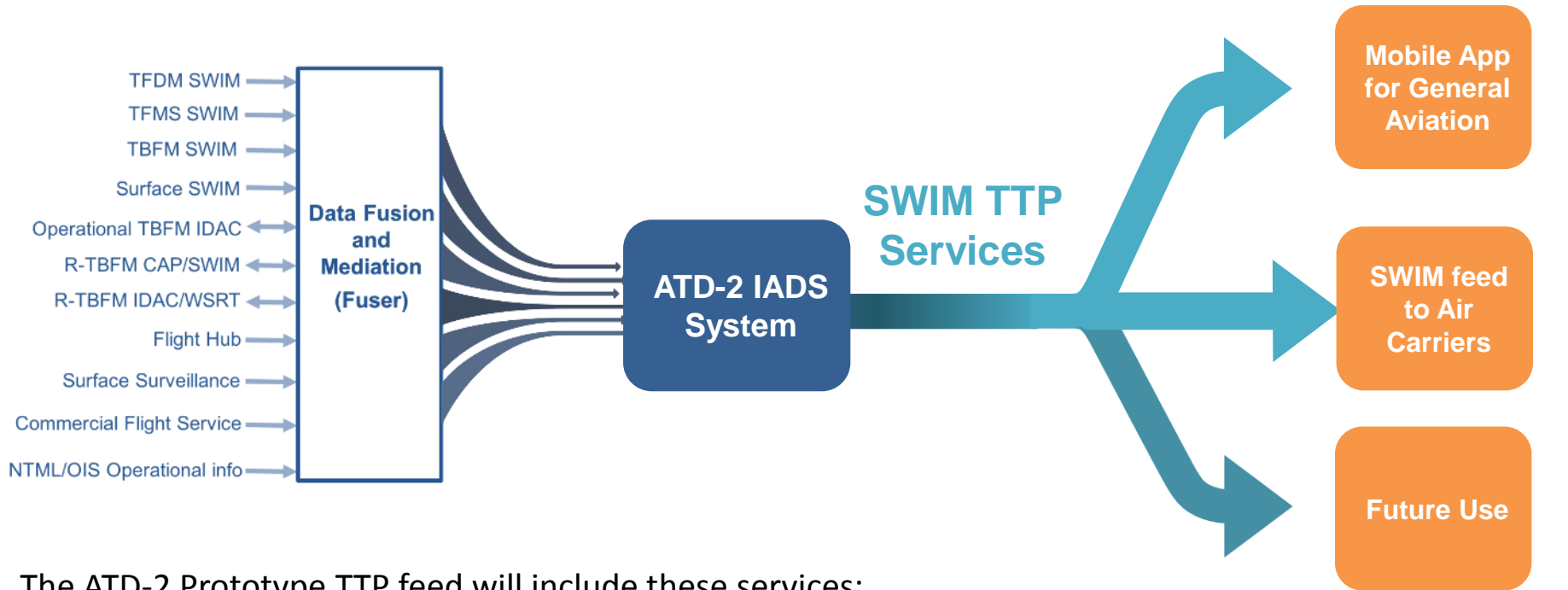
Electronic Data Exchange

Electronic Data Exchange between ATCT and Airlines



*NOTE: With TFDm, the data to and from ramp tools will need to be routed through the airline's SWIM feeds

NASA and the FAA are collaborating to provide a prototype TFDM Terminal Publication (TTP) feed via SWIM R&D network as part of the ATD-2 Field Demonstration



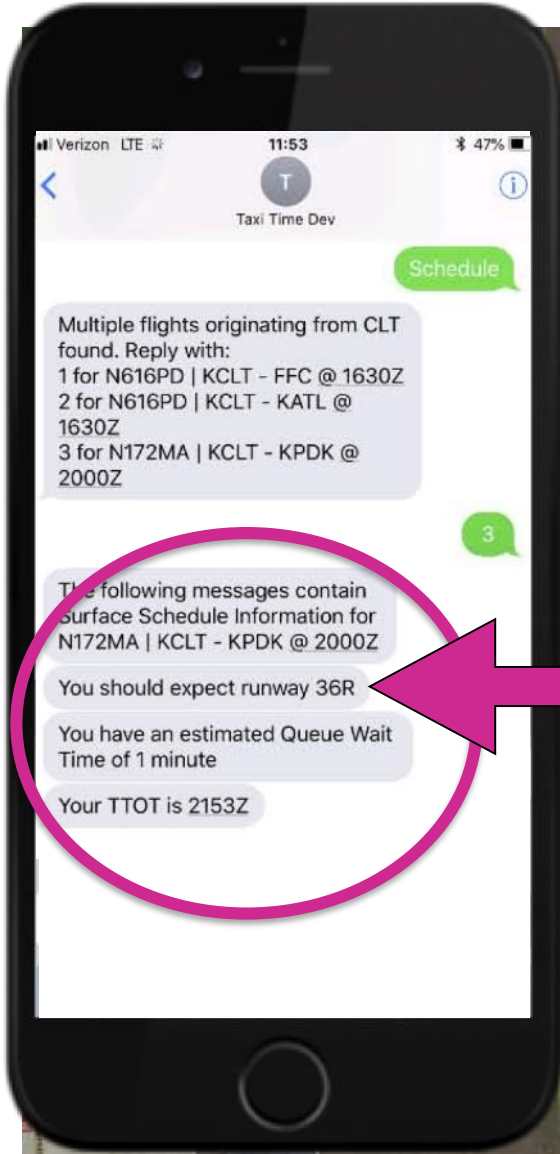
The ATD-2 Prototype TTP feed will include these services:

- Flight Data
- Airport Information
- Traffic Management Restrictions
- Flight Delay
- Operational Metrics

TTP is now available on SWIM R&D for CLT. You are welcome to onboard now!

Electronic Data Exchange with GA / BA

Mobile App Ready-to-Taxi Time Submission



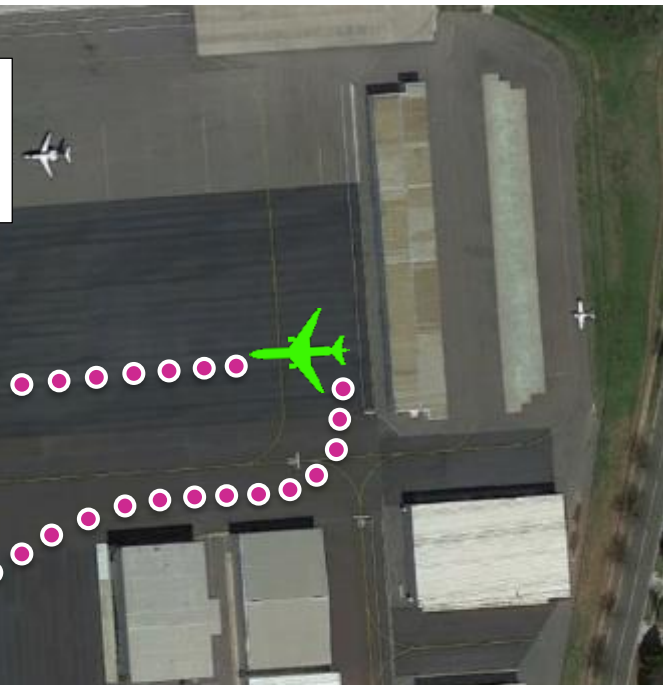
RTT Location
~ 10 – 15 minutes after RTT submission

AMA Ramp

Delta Taxiway

FBO

RWY 36R / 18L
Google Earth



One pilot waits in the FBO for passengers.

When the passengers arrive ...

... the pilot submits their best prediction of Ready-to-Taxi Time (RTT) and Ramp Area (for one Corporate Flight Co., that is +10–15 min)

Pilots receive Data Elements (see image)

- ATD-2 data elements are integrated into AEFS V5.5.0 Build 1 which was deployed to CLT on Thu 9/20/2018

AAL2068												BARMY3		KCLT BARMY3 RDU J55 HPW												1836		18L		LC
A321/L												P1820		J191 PXT KORRY4 KLGA																
049												350		KLGA C8												1837				
Priority	EMRG	ONR	V	MA	H/S	RTN	APREQ	SWAP	STOP	NoCLR	NoDP	FRC	PTT	FR	Pen	Eraser	Clear													
EOBT 1820			TOBT 1828			AOBT 1830			TMAT 1836			AMAT 1830			ETD 1833															

Parking Gate

APREQ indicator

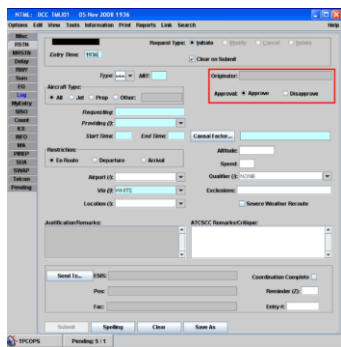
APREQ release time in block 16

TMAT in block 11

ATD-2 Times: EOBT, TOBT, AOBT, TMAT, AMAT, ETD (TTOT)

Other data from ATD-2: ONR, SWAP, STOP

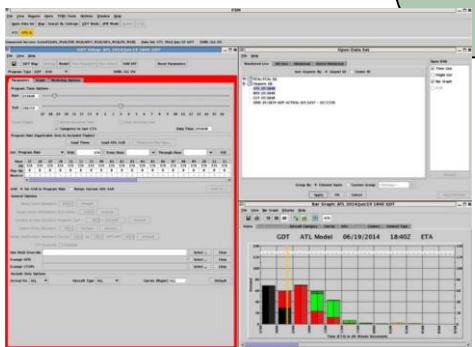
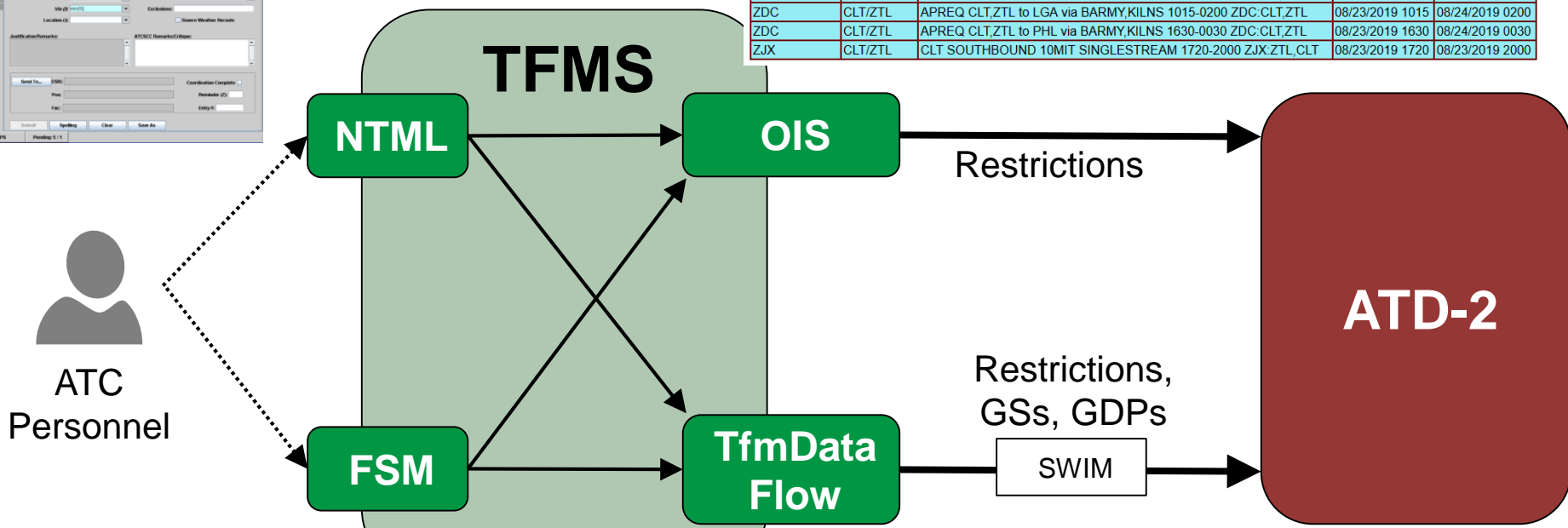
Electronic Data Exchange Of Traffic Management Initiatives (TMIs)



Current Restrictions

This page refreshes every minute. Last updated Fri, 23 Aug 2019 17:40:37 UTC

REQUESTING	PROVIDING	RESTRICTION	START TIME	STOP TIME
ZDC	CLT/ZTL	APREQ CLT,ZTL to DCA via BARMY,KILNS 1145-0100 ZDC:CLT,ZTL	08/23/2019 1145	08/24/2019 0100
ZDC	CLT/ZTL	APREQ CLT,ZTL to EWR via BARMY,KILNS 1015-0200 ZDC:CLT,ZTL	08/23/2019 1015	08/24/2019 0200
ZDC	CLT/ZTL	APREQ CLT,ZTL to JFK via BARMY,KILNS 1015-0200 ZDC:CLT,ZTL	08/23/2019 1015	08/24/2019 0200
ZDC	CLT/ZTL	APREQ CLT,ZTL to LGA via BARMY,KILNS 1015-0200 ZDC:CLT,ZTL	08/23/2019 1015	08/24/2019 0200
ZDC	CLT/ZTL	APREQ CLT,ZTL to PHL via BARMY,KILNS 1630-0030 ZDC:CLT,ZTL	08/23/2019 1630	08/24/2019 0030
ZJX	CLT/ZTL	CLT SOUTHBOUND 10MIT SINGLESTREAM 1720-2000 ZJX:ZTL,CLT	08/23/2019 1720	08/23/2019 2000



```

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Common Situation Awareness

Common Situational Awareness between ATCT and Airlines

- A single system running with multiple users (i.e., Tower, Ramp, TRACON, Center) to interact with one another
- Users share the same data, exchange information, and make decisions collaboratively
- Inputs are from multiple sources, including FAA, Airlines, ATC, and Ramp



Ramp Traffic Console (RTC) and Ramp Manager Traffic Console (RMTc)



Surface Trajectory-Based Operation (STBO) Client - Tower, TRACON, and Center

The screenshot displays the ATD2 Ramp View interface. At the top, there is a navigation bar with 'User Profile', 'Map Options', 'Tools', and 'About'. The current time is 21:45:53. A search bar is on the right with 'Search' and 'Clear' buttons. Below the navigation bar are view controls: 'Set', 'View 1', 'View 2', 'View 3', 'Zoom In', 'Zoom Out', 'Reset View', 'Rotate Left', 'Rotate Right', and a dropdown menu set to 'N_Normal'. The main area shows an aerial view of an airport ramp with numerous aircraft callouts (e.g., AAL1939 D13, JIAS142 E7 A14, AAL2068 LGA). A green arrow points to a specific aircraft. At the bottom right, there is a console with three buttons: 'Arrivals' (4), 'Eastbound' (0/0), and 'Westbound' (0/0). Red lines and boxes highlight specific UI features across the interface.

Notifications, User Profile, Map Options, & Tools

Set and Save up to 3 Views

Zoom/Rotate/Reset View

Airport Configuration, SMD, Ramp Status, & Search

Runways and Near Arrival Count: click to toggle open lists

The ramp traffic console has many lessons learned woven into its Human Computer Interface

ATC to Operator

- Real-time traffic management initiatives
- Airport configuration coordination
- Runway intent information

Ramp Tool Colors and Symbology

Call for release (APREQ)

UAL1087 A319 E
KILNS-EWR
A2100
A10 27 18L 1916

Ground delay (EDCT)

FDX1935 B752 E
KILNS-EWR
E2230
FDX 18L 916

Miles in trail (MIT)

DAL8928 B752 E
BARMY-EWR
M20
A2 27 18L 1916

APREQ + EDCT

JIA5026 A319 E
KILNS-DCA
E2340Q
E5 27 18L P1916

Dep Fix closure

JBU1118 E190 E
KILNS-JFK
A4 27 18L 1916

ATC runway change

SWA210 A319 E
KILNS-DCA
18L P1916

Dep Fix change (CDR)

AAL1864 A319 E
KILNS-DCA
D12 27 18L P1916

Airport ground stop

UPS1283 B752 E
KILNS-**PHL**
UPS 18L 1916

- Arrivals are green
- After pushback, engine symbol indicates spool up state
- 757 aircraft has blue and white border
- Sector ownership
- Westbound departures are brown, eastbound are blue
- Hollow icon (if no surveillance)
- Heavy aircraft has orange and white border
- Priority flight has green border
- A flight assigned to the hardstand has yellow border
- Super type aircraft has thick white border

AAL523 A320 S
ICONS FLL
C19 23S 36R 1726

AAL523
Flight Menu
Handoff
Emergency
Hold
Enable Air-Start
Pushback Flight

AAL523 A320 S
ICONS FLL
C19 23S 36R 1726

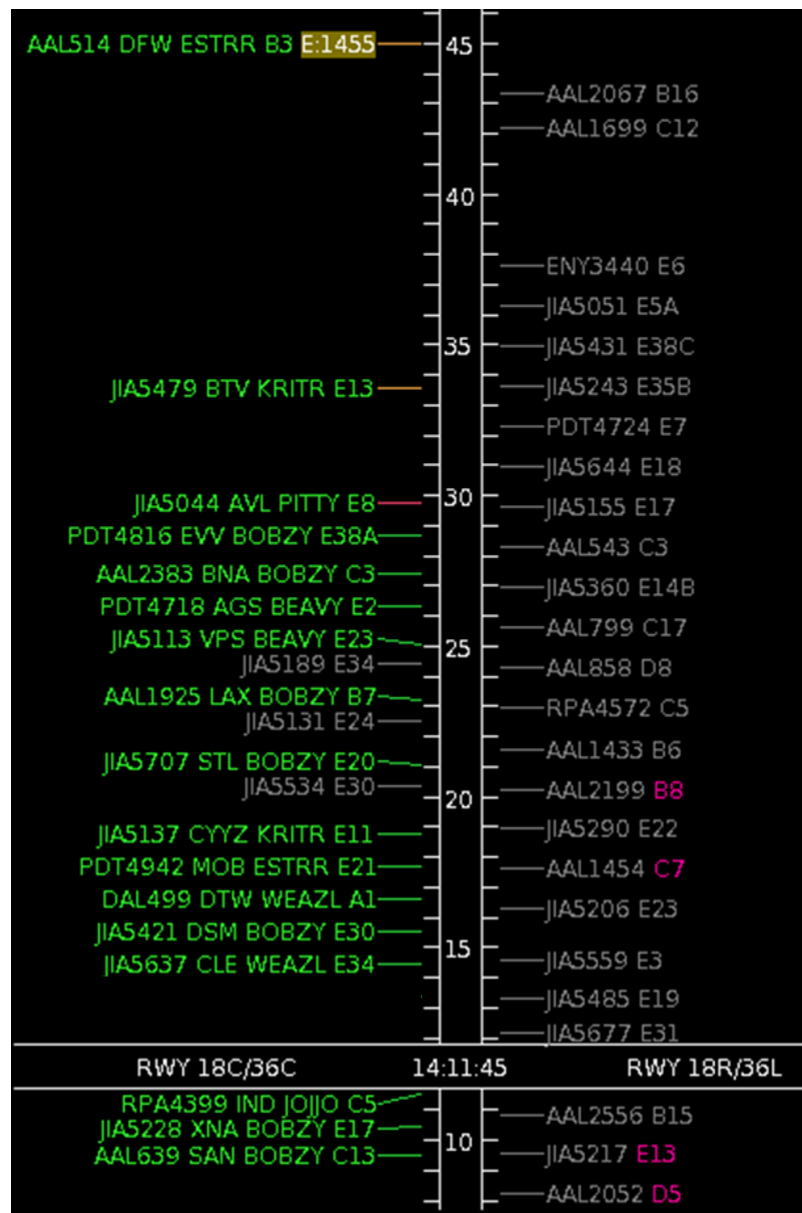
AAL523
Flight Menu
Handoff
Emergency
Undo Hold
Enable Air-Start
Pushback Flight

0:13

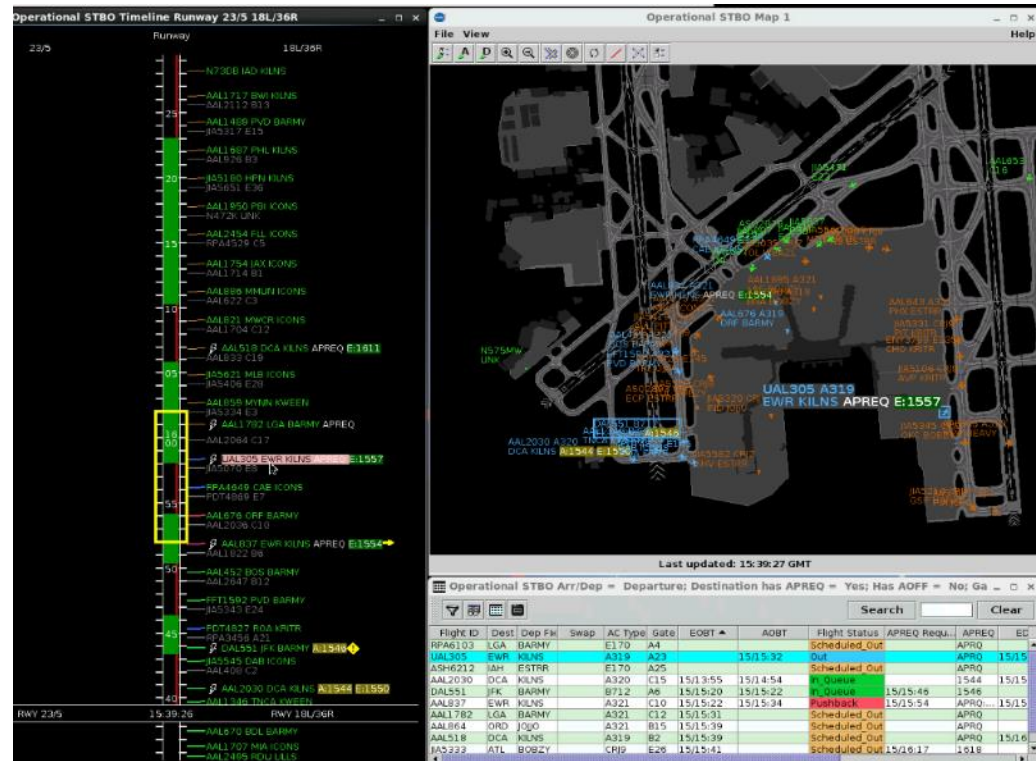
Ramp control entries are **key** to accurate measures of benefit and good system performance

Surface Scheduling

- Predicts when each flight will take off or land
- Considers
 - Current flight state
 - Undelayed 4D trajectory
 - Other flights arriving and departing from the same runway
 - Runway separation requirements
 - EDCTs
 - Release times
 - Ground stops and fix closures



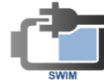
- ATD-2 allows ATCT TMC to electronically negotiate release time into the overhead stream using IDAC-style interface
- Displays green-space / red-space that shows available time slots for flight to take off
- Take off time prediction for flight shown relative to other flights on the same runway
- EDCT and local information displayed for the flight



Pre-Scheduling with EOBTs from CLT to ATL / ORD

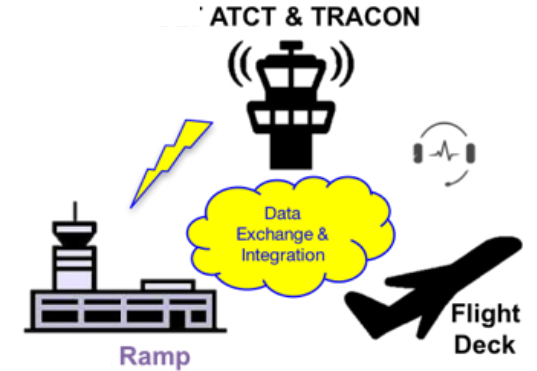
1

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



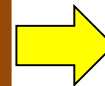
2

Center TMC approves or adjusts the time based on center constraints

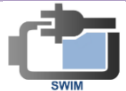


3

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

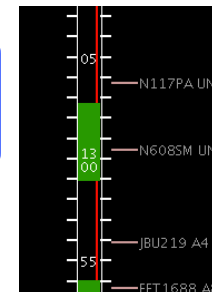


The data is made available on the TTP SWIM feed so that Operators can get it to their pilots



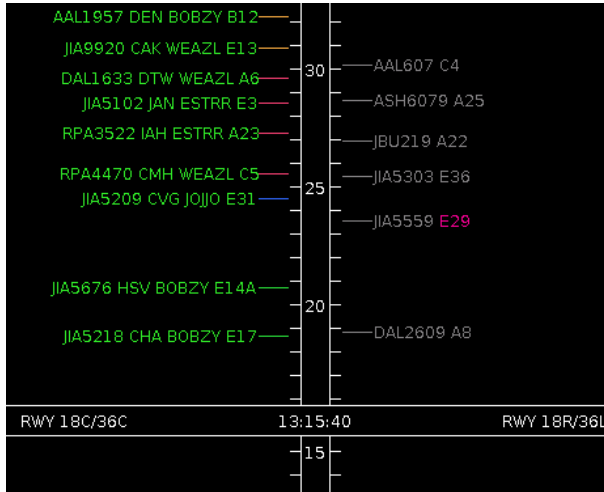
4

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

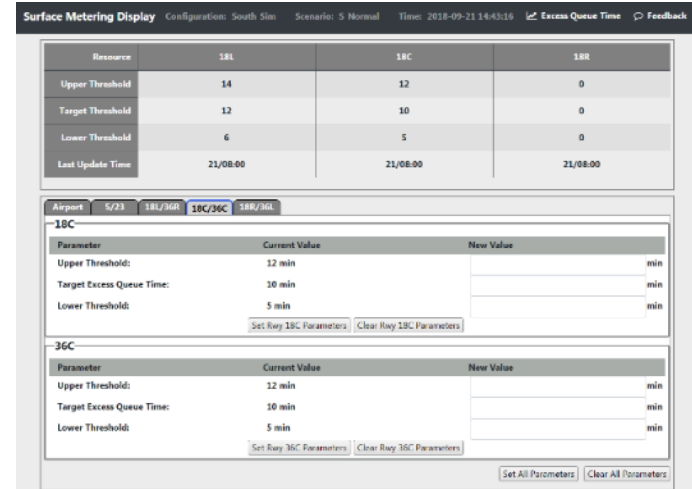


Surface Metering

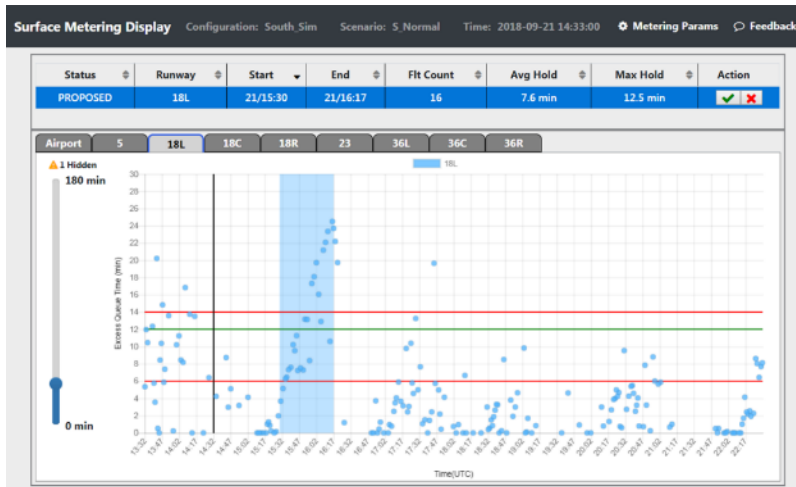
1 ATD-2 generates demand and capacity predictions



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

