Ramp Traffic Console (RTC) Capabilities and Use in Operational Environment (Part 1)

NASA ATD-2 Industry Workshop

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Agenda

- **RTC Overview**
  - CLT AAL Ramp Tower
  - Color coding, symbology, icons, visual reminders
- **Operational Use Cases**
  - Surface Metering
  - EDCT (Expect Departure Clearance Time)
  - APREQ (Approval Request/Call for Release)
  - Ground Stops
  - Gate Conflicts
  - Flight Menu: Op Nec, Priority, Reposition
  - Right-Click Menus: Air Start, Emergency, Gate Closure

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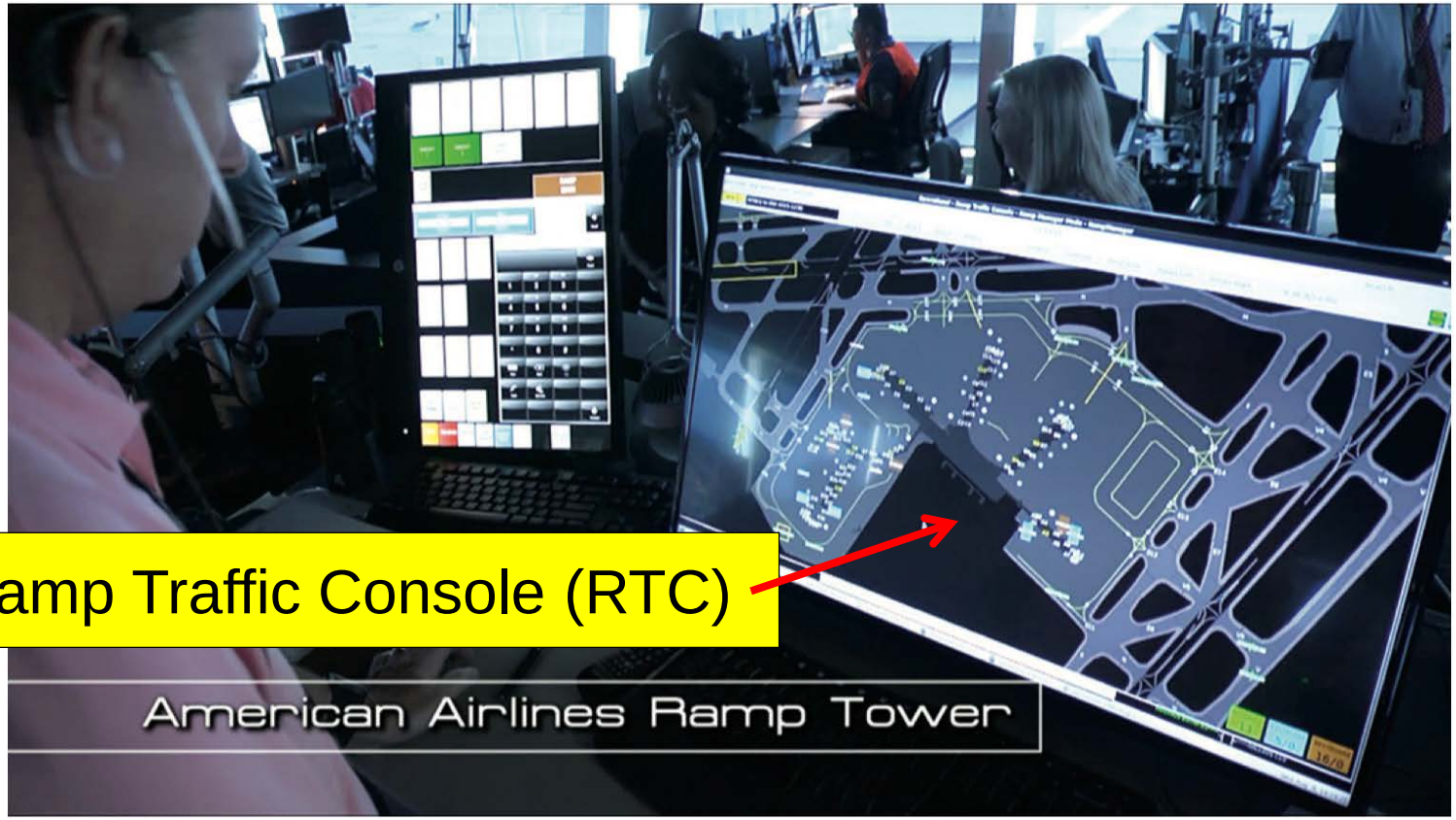
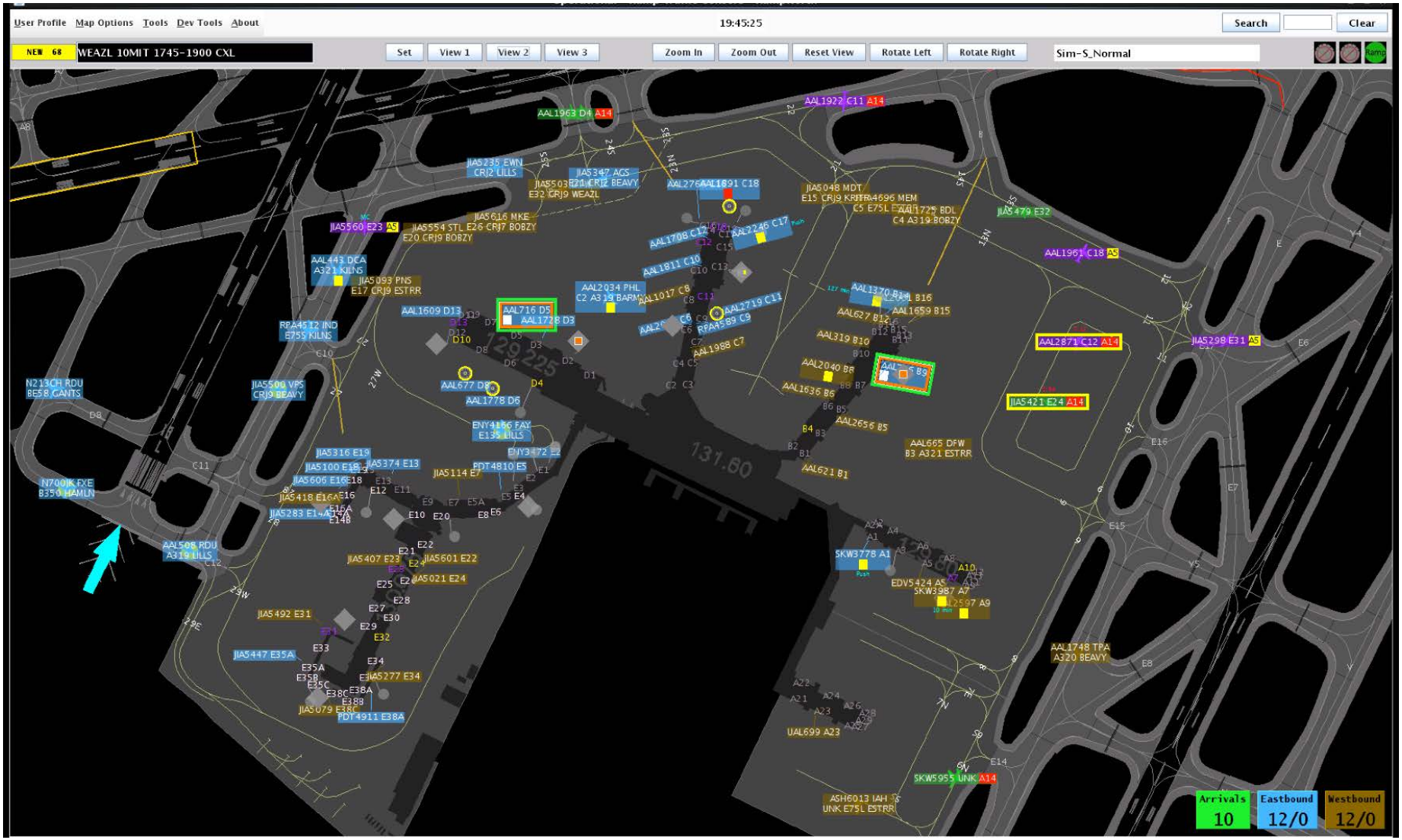
RTC Overview: CLT Ramp

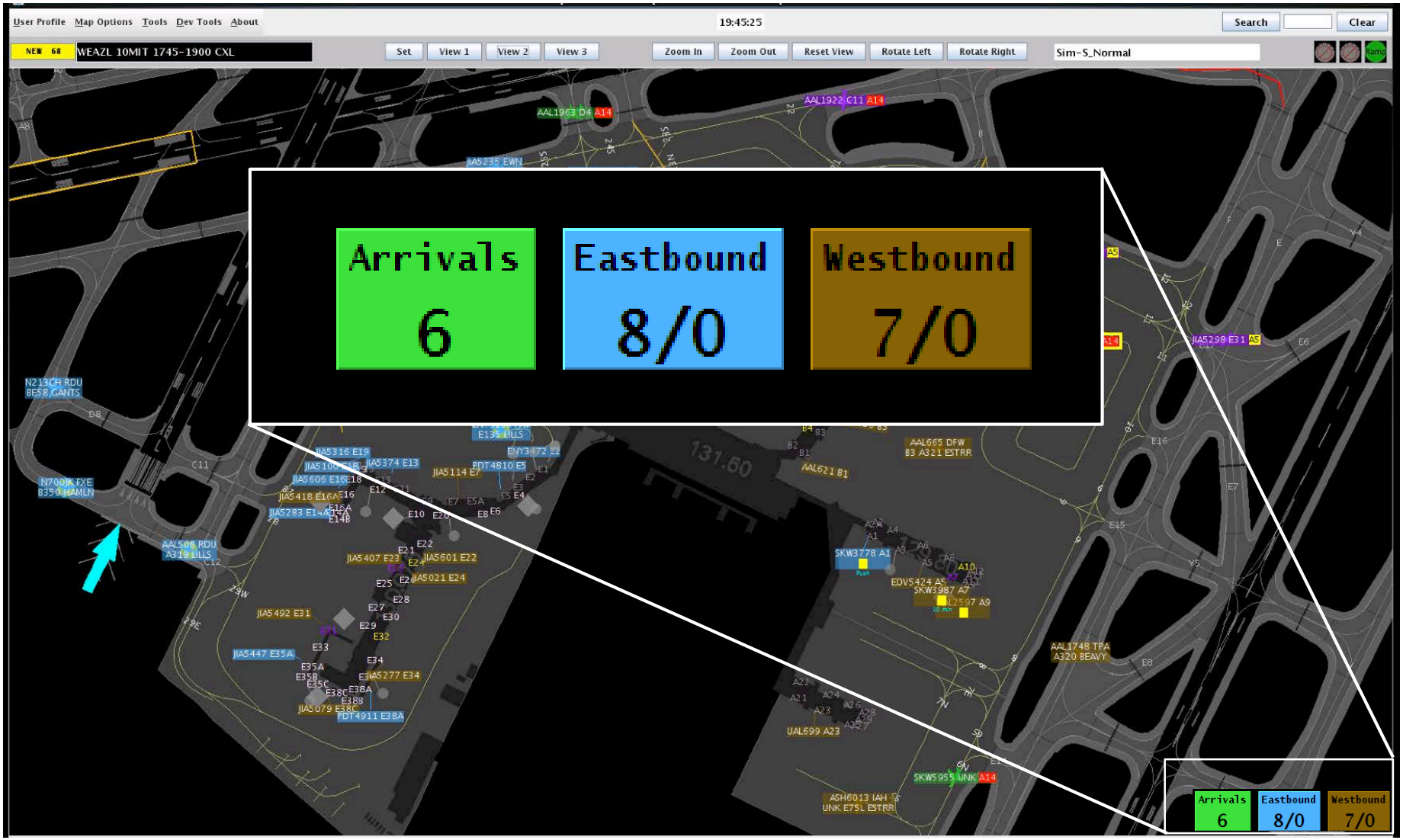
- Ramp Traffic Console (RTC)
  - CLT: Four Ramp Sector Controllers (North, East, South, West)
- Ramp Manager Traffic Console (RMTC)
- Deployed to CLT AAL Ramp Tower: October 2017



RTC Overview: Interface



RTC Overview: Interface



RTC Overview: Interface

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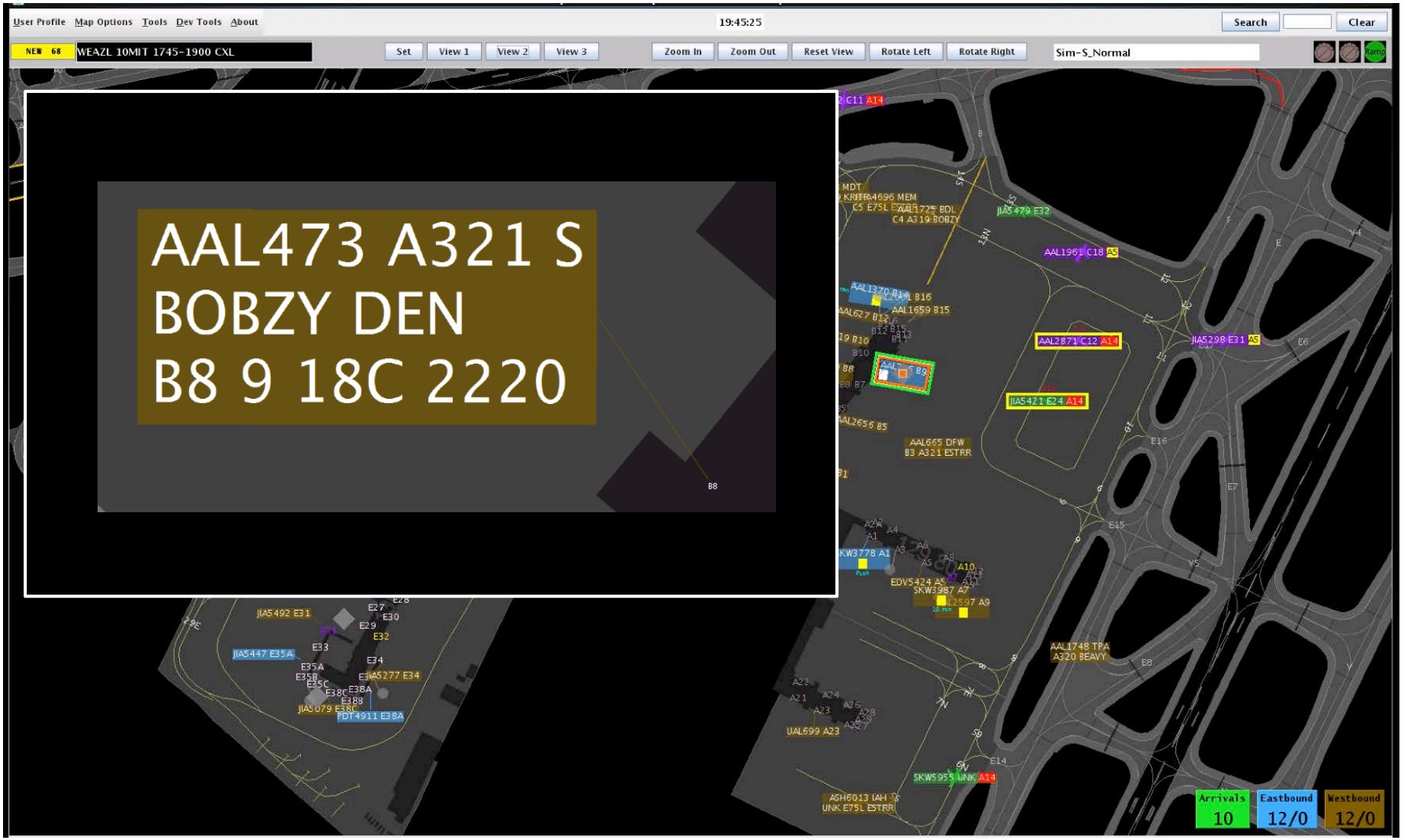
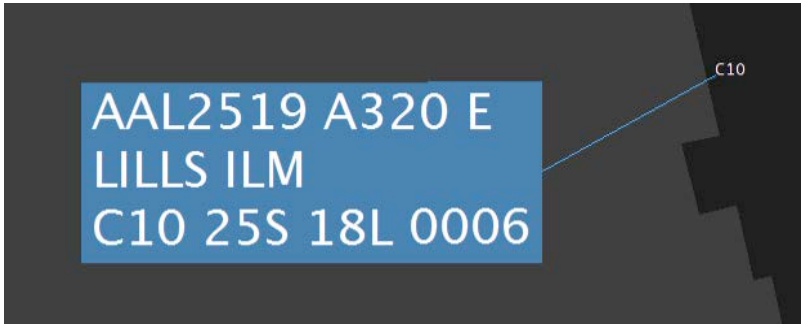


RTC Overview: Interface

Westbound Departures (brown)



Eastbound Departures (blue)

Arrival (green)

Arrival (w/ Gate Conflict) (magenta)

RTC Overview: Interface

Flight State

Parked at Gate

Flight Strip
(tethered to gate)

Pushback/Spool-Up

Engine Icon

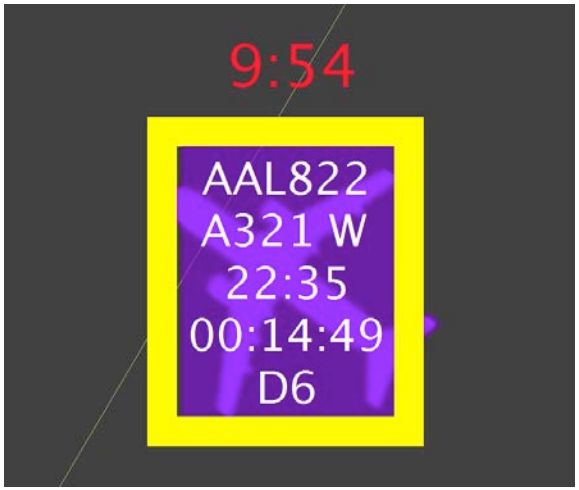
Taxi

Flight Icon
w/ Data Tag

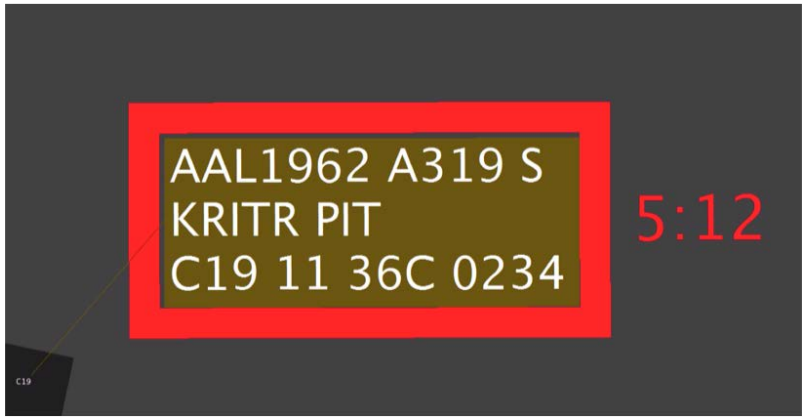
RTC Overview: Interface

Blue/White Border: B757 aircraft

Orange/White Border: Heavy aircraft



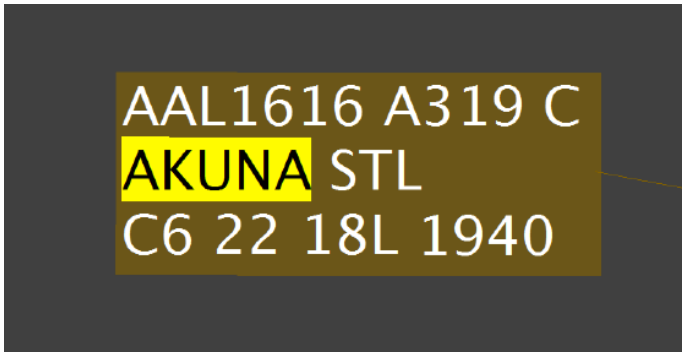
Yellow Border & Timer: Hardstand



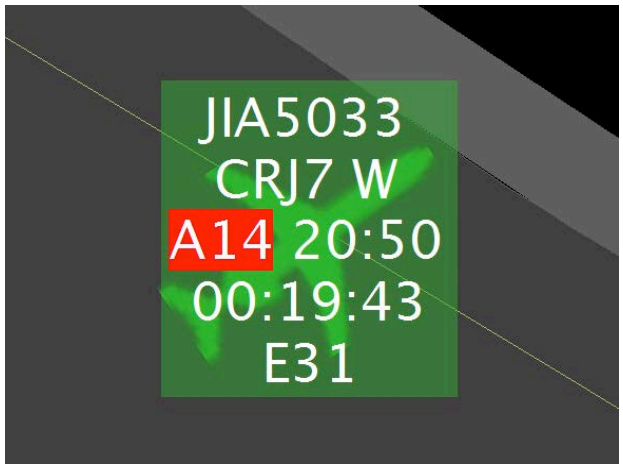
Red Border & Timer: Pilot Ready

RTC Overview: Interface

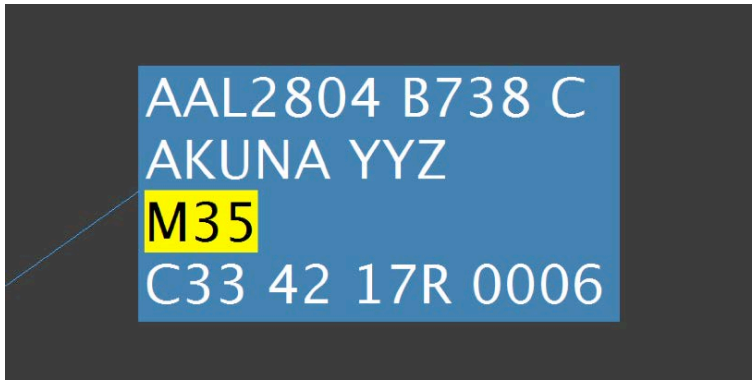
Departure Fix Closure



Departure Fix Change



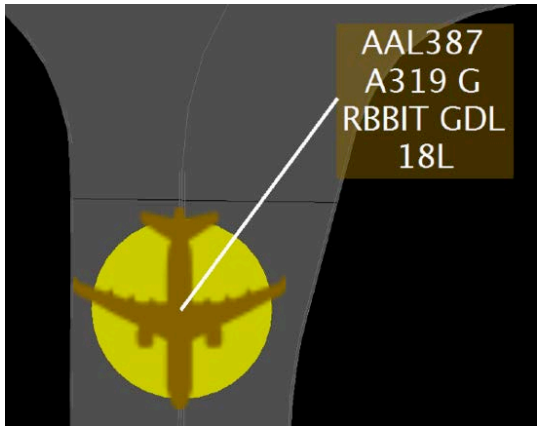
Arrival Flights (“A14”)



Miles-in-Trail (MIT) Restriction

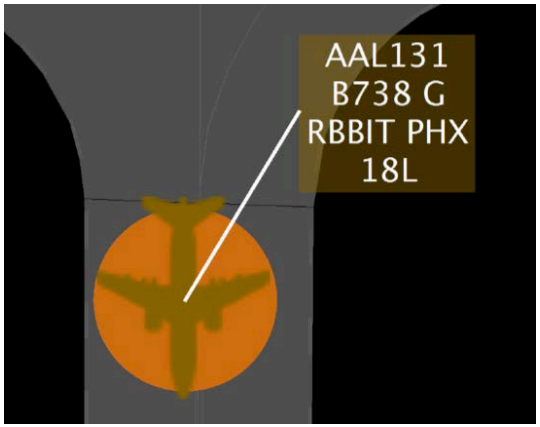
RTC Overview: Interface

- **Long On Board (LOB)**
  - Displayed for common situational awareness.
  - For **departures**, the LOB timer starts at pushback: Current time minus Actual Off-Block Time (AOBT) until the departure takes off.
  - For **arrivals**, the LOB timer starts at touchdown: Current time minus the Actual Landing Time (ALDT) until the arrival is in the gate.



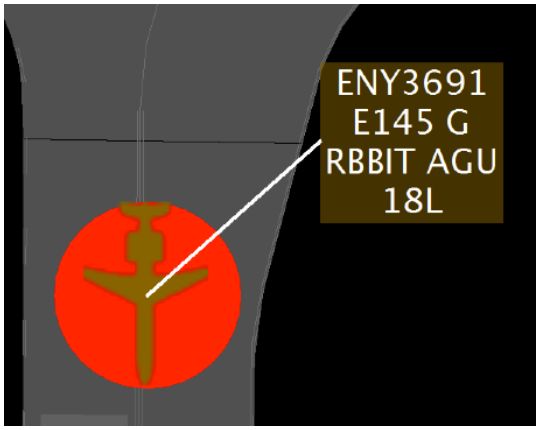
Yellow

LOB Timer:
60 – 89 minutes



Orange

LOB Timer:
90 – 119 minutes

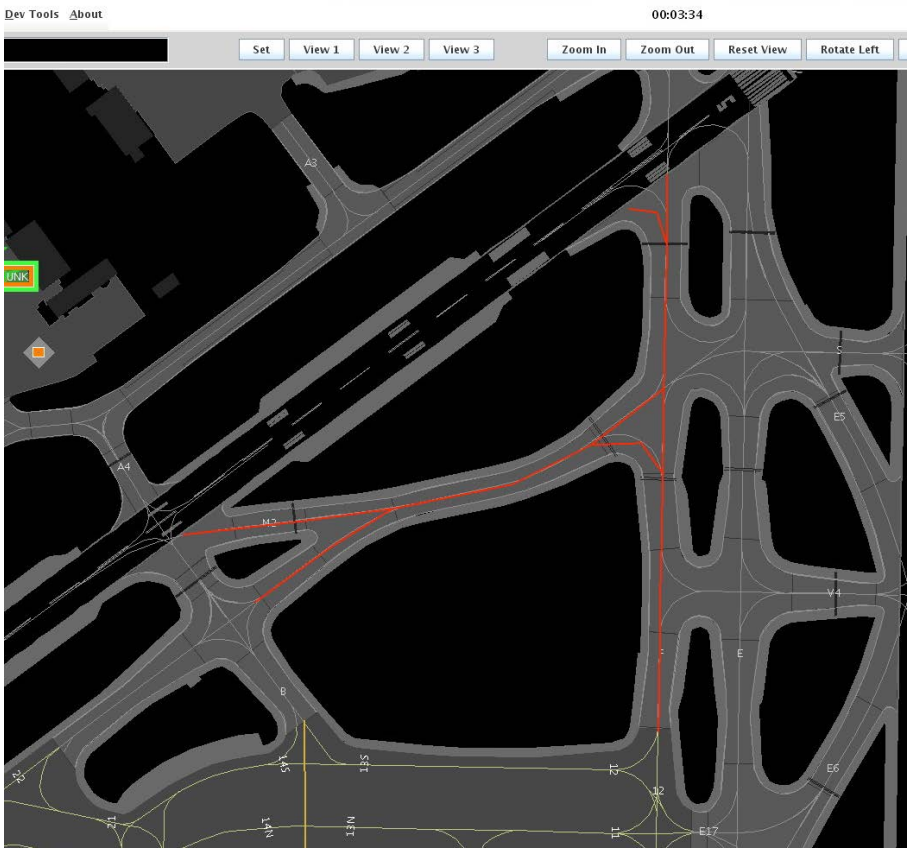


Red

LOB Timer:
120+ minutes

RTC Overview: Interface

Closed Runway
(red highlight with white “X”s)



Closed Taxiway
(red centerline)

RTC: Data Exchange

ATD-2 Scheduler

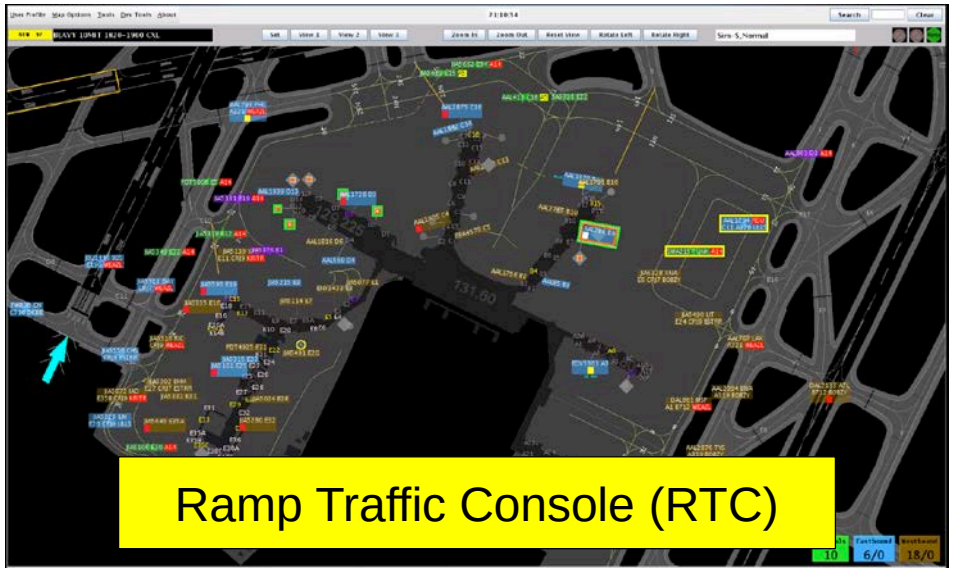
Gate Hold Advisories (Metering)
Gate Hold Advisories (TMI)

Commercial Airlines

Earliest Off-Block Time (EOBT)
P-Time

FAA

EDCT
APREQ
Miles-in-Trail
Ground Stops



Ramp Traffic Console (RTC)

Airport Surface Surveillance

Aircraft Position
Flight State
Hardstand

ATC Tower Input via STBO

Departure Fix Closures
Airport Configuration
Taxiway/Runway Closures
APREQ Time

Ramp Input into RTC

Priority Flights
Emergency Status
Flight State
Flight Cancellations
Runway Change for Op Nec

Flight Deck

Runway Change for Op Nec.
Pushback Delay

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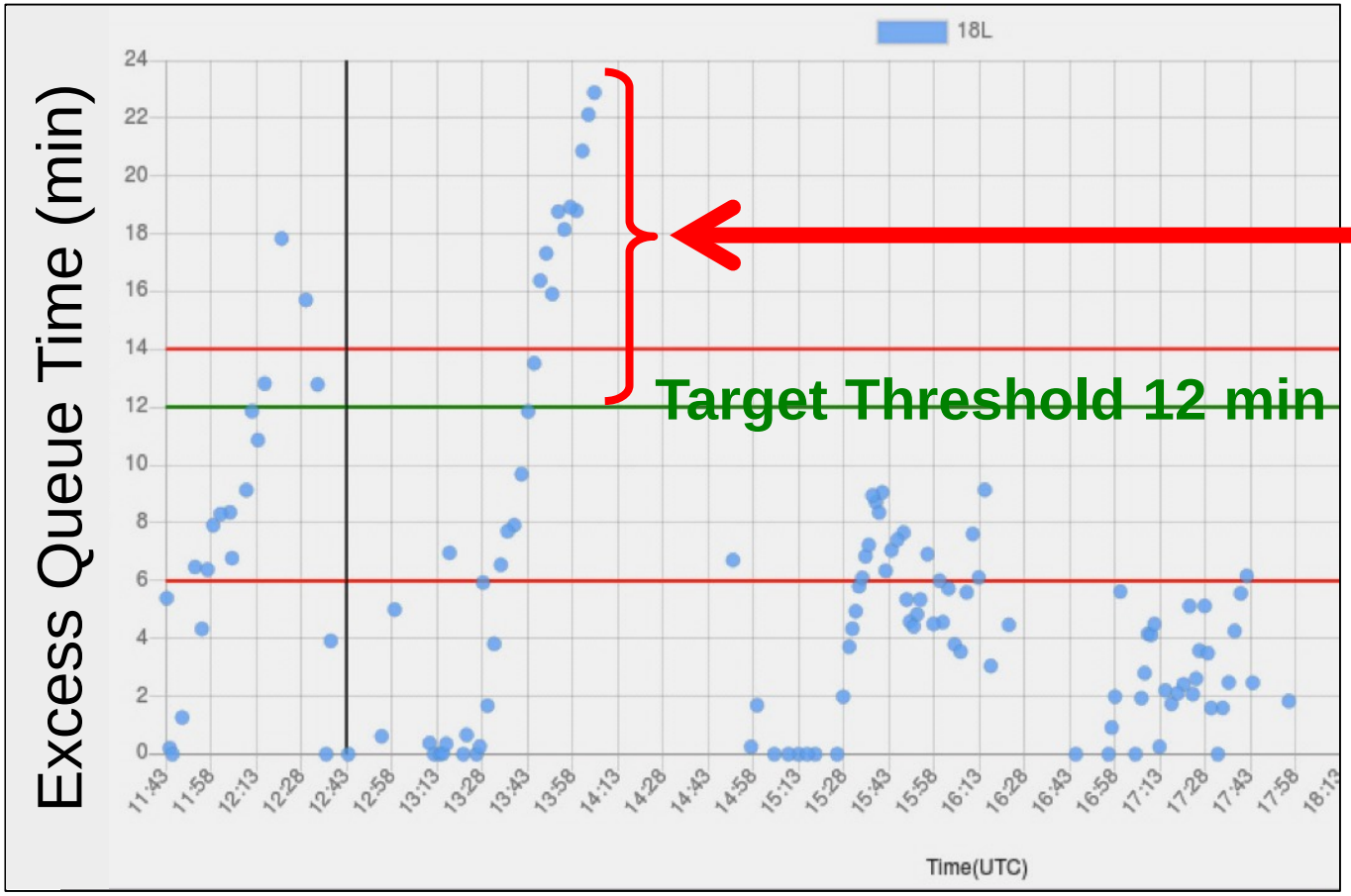
Operational Use Case: Surface Metering

Surface Metering

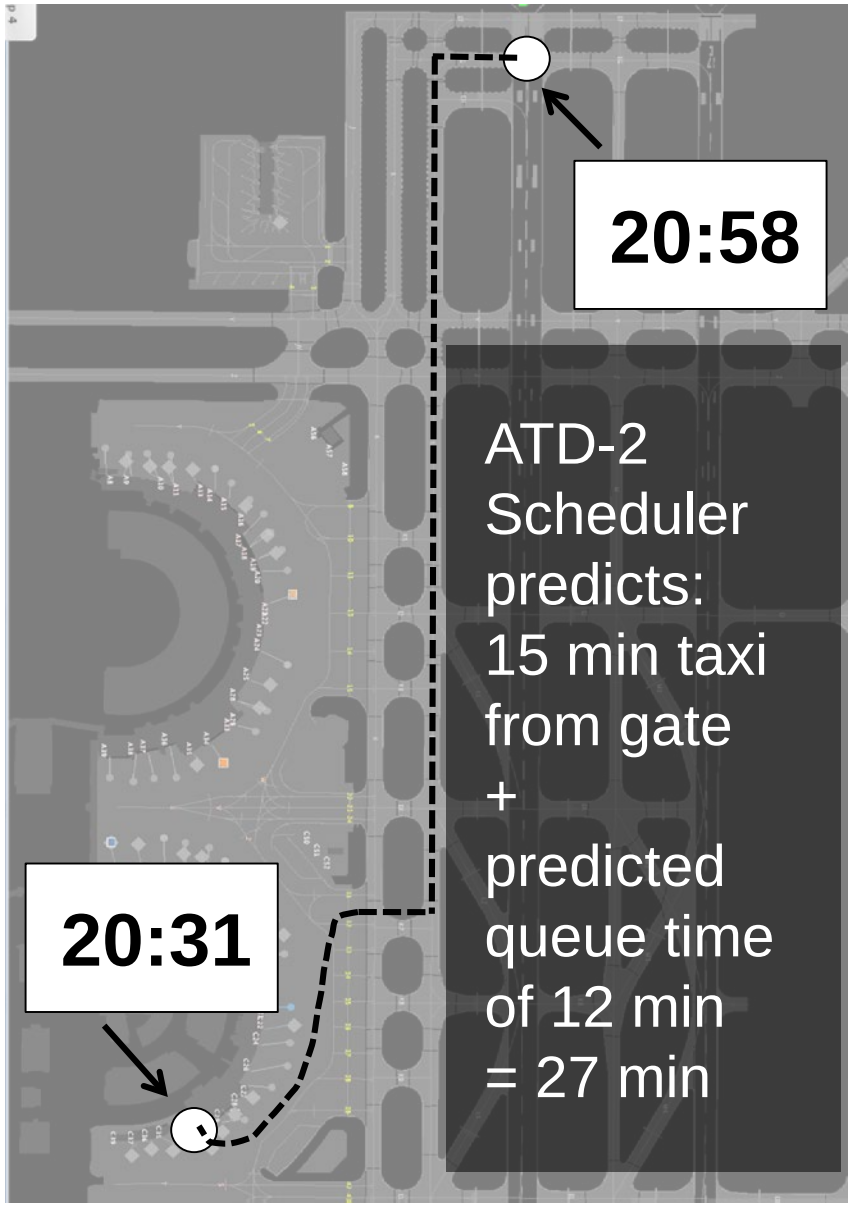
- CLT: Metering started Nov 2017
- Initially, Banks 2 and 3 at CLT; since expanded.
- Use short gate holds to reduce departure queue length.
- Bank 2 (example) (vary by bank):
  - 23% of departures were advised a gate hold.
  - 16% were actually held at the gate.
- Average gate hold is 6 minutes (Banks 2 and 3).

Operational Use Case: Surface Metering

- Short gate holds to reduce time in departure queue.
- Surface Metering is triggered when the predicted Excess Queue Time exceeds the target threshold (e.g., 12 min).



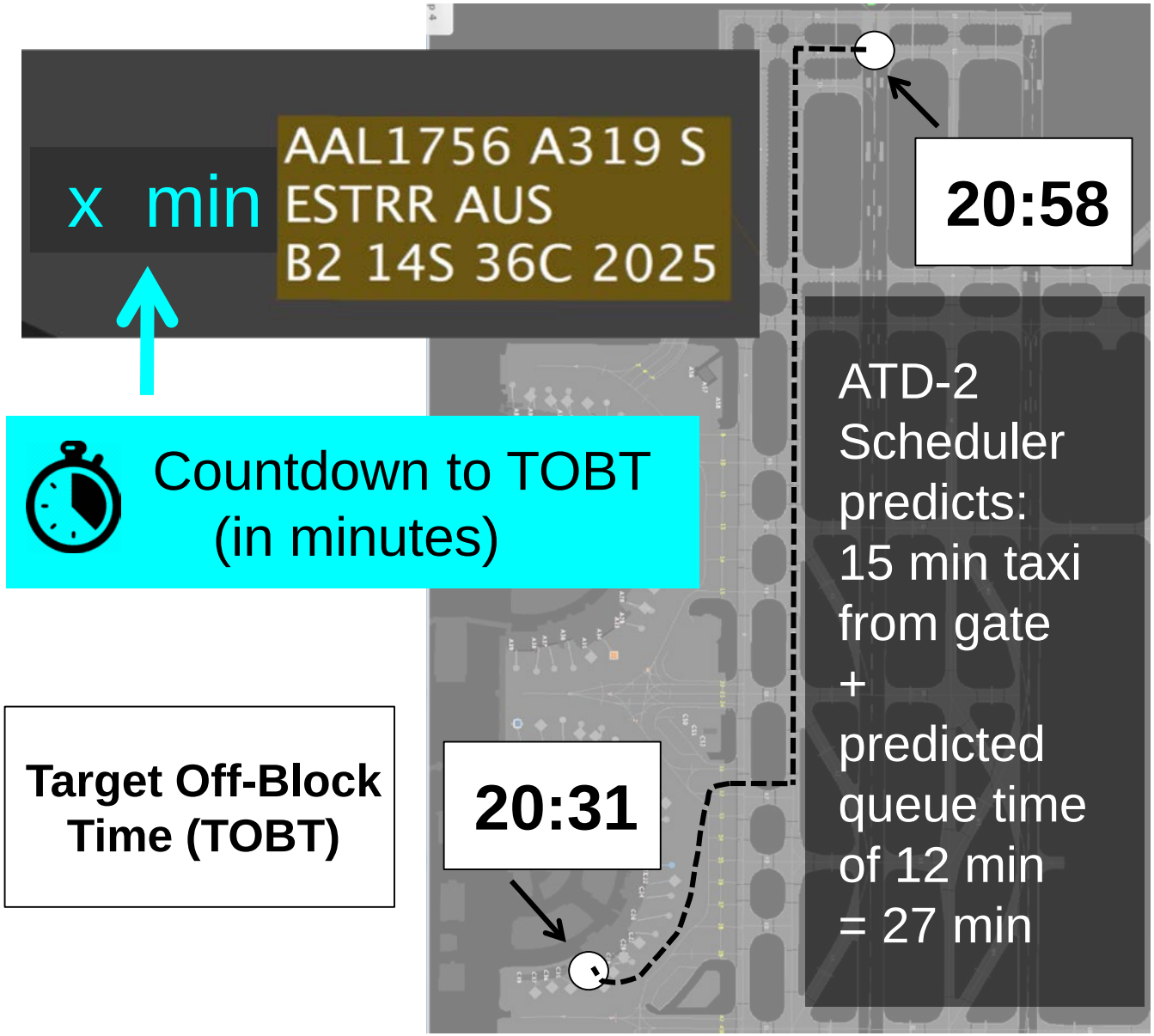
Operational Use Case: Surface Metering



ATD-2 Surface Scheduler develops a runway schedule, from which TOBT is derived.

Target Off-Block Time (TOBT)

Operational Use Case: Surface Metering



Target Off-Block Time (TOBT)

ATD-2 Surface Scheduler develops a runway schedule, from which TOBT is derived.

Operational Use Case: Surface Metering

Schedule

This flight is subject to Surface Metering,
its Advised Gate Hold = 6 min

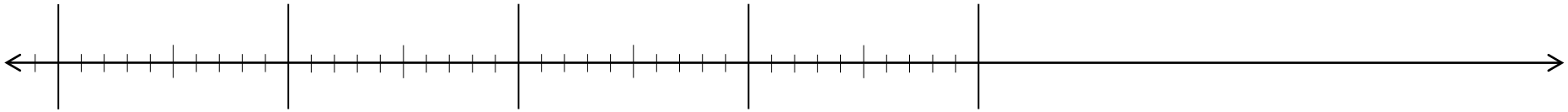
Runway Time
– undelayed taxi time (15 min)
– predicted queue time (12 min)
= TOBT

20:25 Earliest Off-Block Time (EOBT) (from airline)

20:31 Target Off-Block Time (TOBT)

20:58 Runway Time (Scheduler)

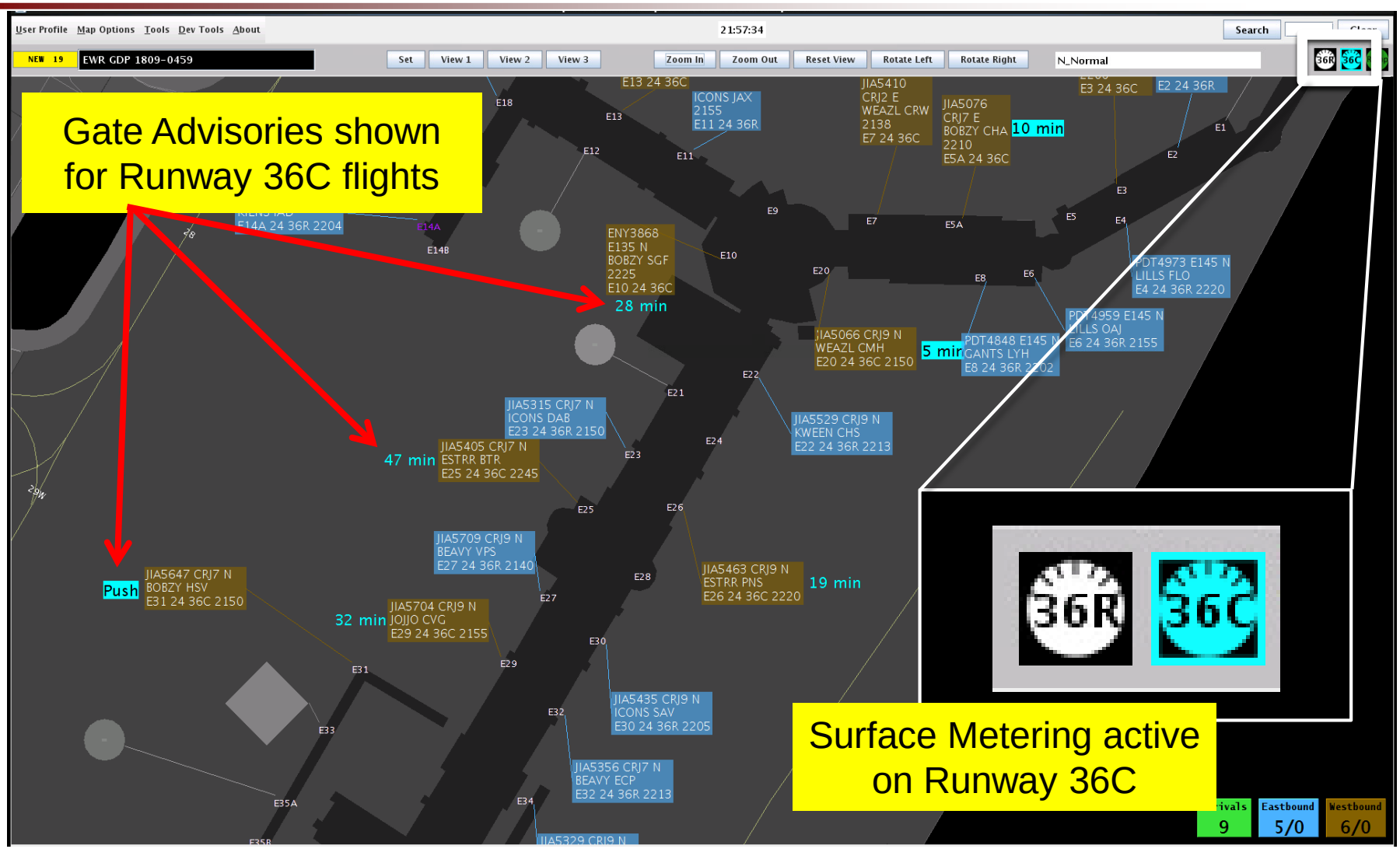
RTC Display



40 min | 30 min | 20 min | 10 min | **0 min** = TOBT

Countdown to TOBT (in minutes)

Operational Use Case: Surface Metering



Data Exchange:

ATD-2 Surface Scheduler → **RTC display in Ramp Tower**

Operational Use Case: Surface Metering

Gate Hold Advisory:

- Countdown to TOBT in min increments
- Advisory can change (jump) in accordance with TOBT changes

Inverted colors; highlighted background = Frozen

Static Time Horizon (STH):

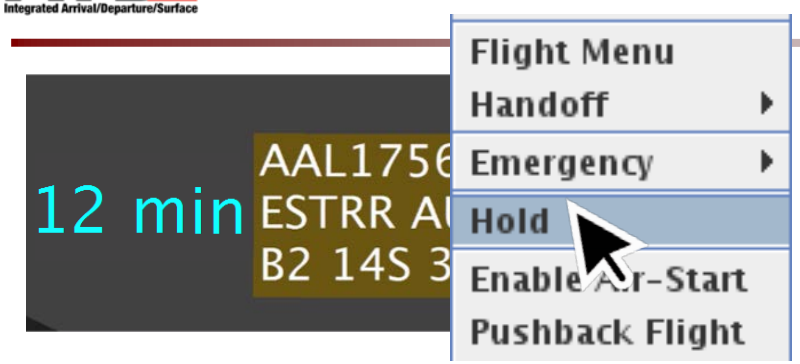
- At 10 min (configurable) prior to TOBT:
  - TOBT is frozen
  - Continues to count down to TOBT
  - Frozen (black text, cyan highlight).

Pushback Advisory:

- At TOBT, countdown = 0 min
- PUSH is indicated

Flight Deck calls for Pushback

Operational Use Case: Surface Metering



Pilot Calls 'Ready' prior to TOBT:

- Ramp Controller makes input into RTC
- Select "Hold" form right-click menu

Putting a Flight on Hold:

1) Freezes advisory (black text, cyan highlight).
2) Advisories are shown in *min:sec*
3) Red Border is shown around flight strip.

Gate Hold Advisory:

- Within 2 minutes of the TOBT, highlight turns orange.

Pushback Advisory:

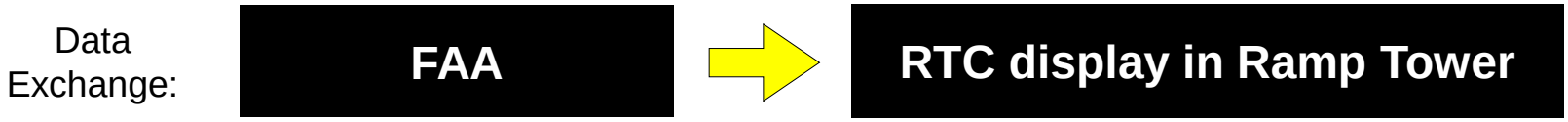
- At TOBT, PUSH is shown (pulses).
- Red Timer: *min:sec* past TOBT.

Operational Use Case: Surface Metering

Operational Use Case: TMIs

Traffic Management Initiatives (TMIs)

- Expect Departure Clearance Time (EDCT)
- Approval Request/Call for Release (APREQ/CFR)
- Gate Hold Advisories for TMI flights are always displayed -- not limited to Surface Metering.
- TMI flights are not subject to Surface Metering.
- TMI Gate Hold Advisories are in support of the wheels-up time.



Operational Use Case: EDCT

Expect Departure Clearance Time (EDCT)

- EDCT wheels-up time populates automatically.

Data Exchange: **FAA** → **RTC display in Ramp Tower**

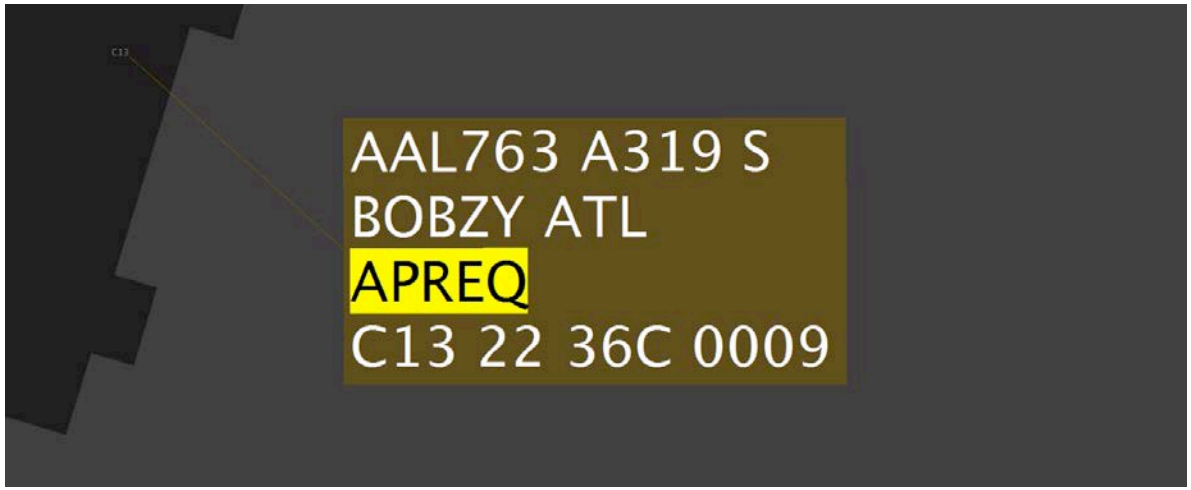
Gate Hold Advisory: Countdown to TOBT

Operational Use Case: APREQ/CFR

Approval Request/Call for Release (APREQ/CFR)

- APREQ indication populates automatically, prior to negotiation of the APREQ time.

Data Exchange: **FAA** → **RTC display in Ramp Tower**

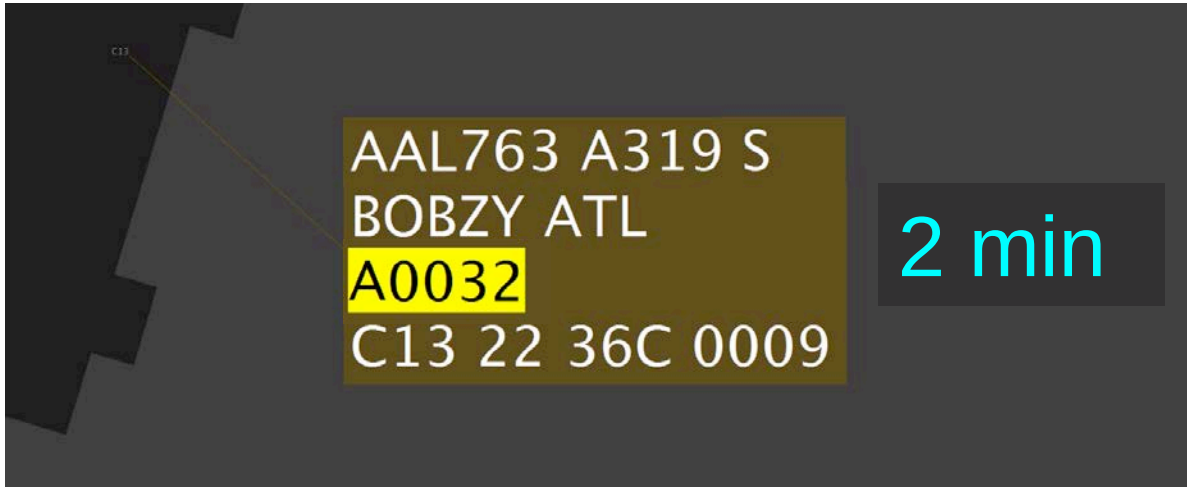


Operational Use Case: APREQ/CFR

Approval Request/Call for Release (APREQ/CFR)

- Pilots contact Clearance Delivery just before pushback to initiate negotiation (electronic) of the APREQ time.

Data Exchange: **Flight Deck** → **Tower (ATC)** → **RTC display in Ramp Tower**



Gate Hold Advisory: Countdown to TOBT

Operational Use Case: APREQ/CFR

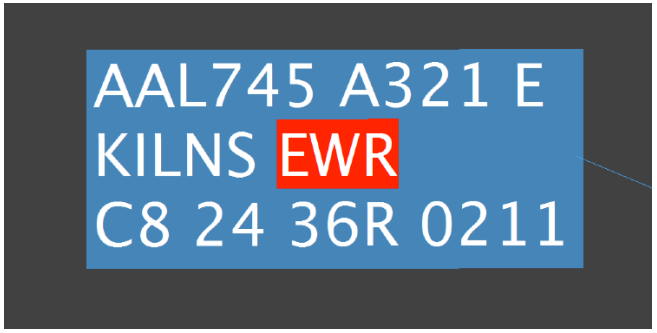
- **Approval Request/Call for Release (APREQ/CFR)**
  - If the APREQ has not been negotiated before pushback, the "APREQ" field is highlighted in red.

Operational Use Case: Ground Stop

Ground Stop at Destination Airport

- Ramp Controller can communicate to Flight Deck for re-planning.

Data Exchange: **FAA** → **RTC display in Ramp Tower** → **Flight Deck**



Ground Stop at Destination (examples)

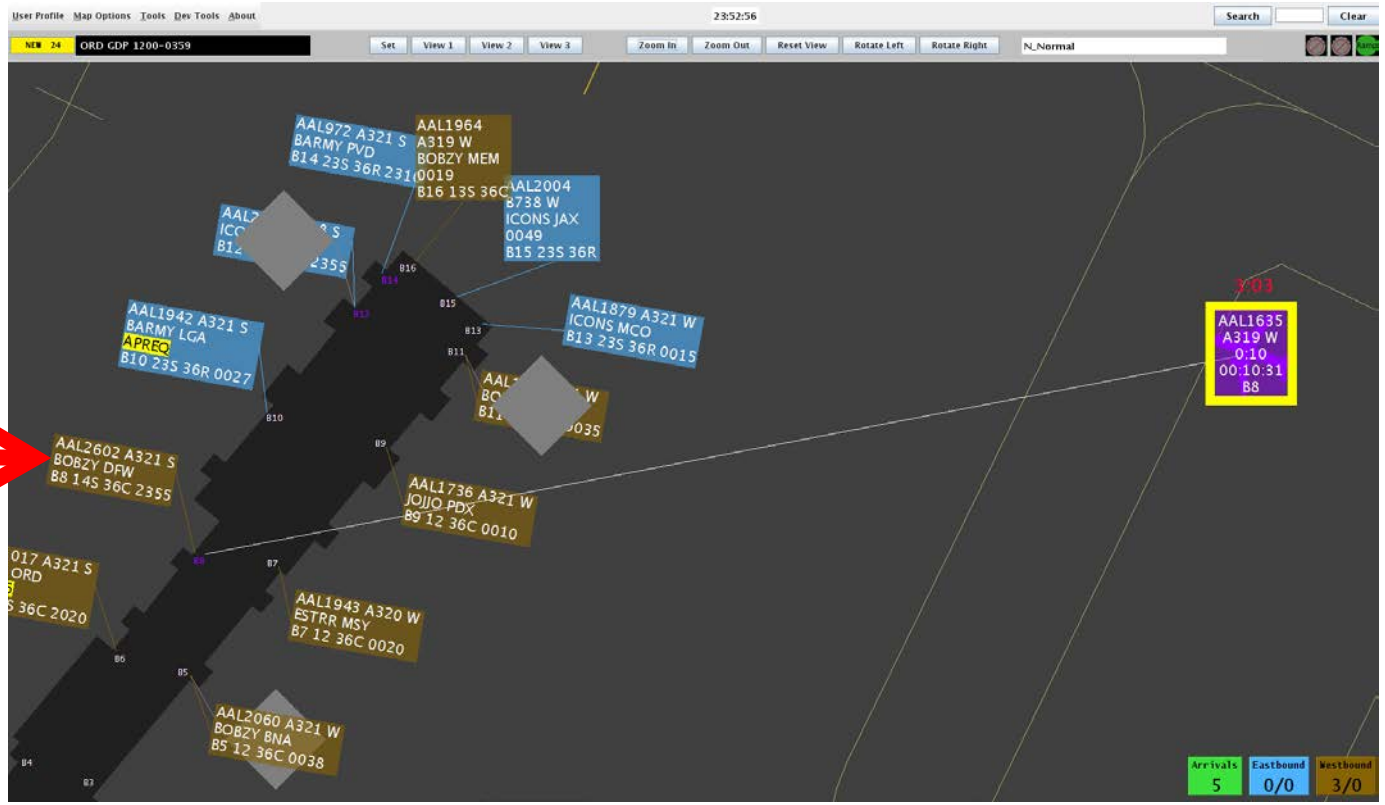
Operational Use Case: Gate Conflict

Gate Conflict

- Magenta arrival and gate number indicate a gate conflict.
- Is indicated 10 min (configurable) prior to wheels-down.
- Indication removed at pushback + 5 min (configurable).

Departure flight is parked at Gate B8.

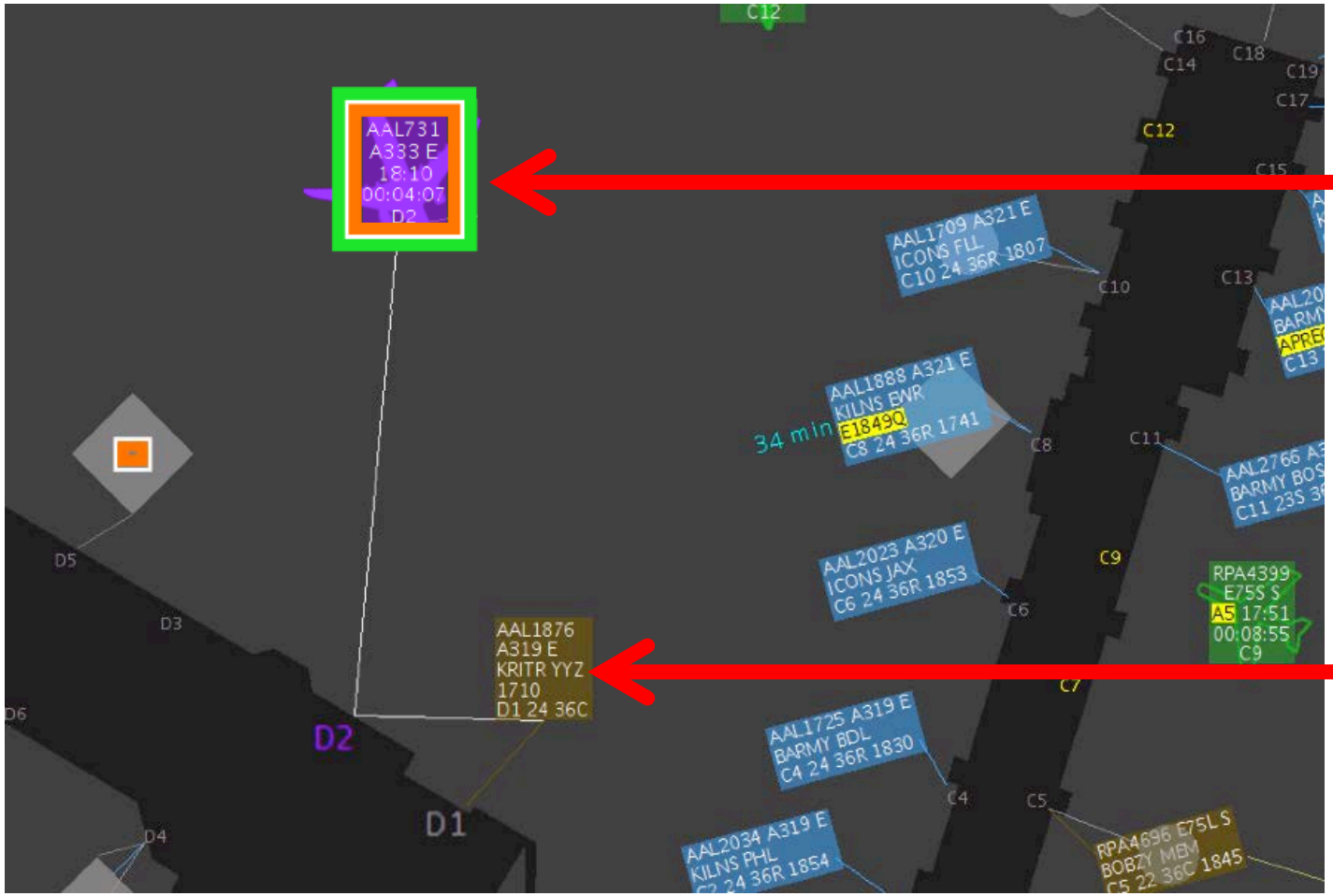
Inbound Arrival for Gate B8 parked in Hardstand.



Operational Use Case: Gate Conflict

Gate Conflict (Adjacent Gate closed to Heavy)

- An aircraft at D1 closes D2 to Heavy aircraft.



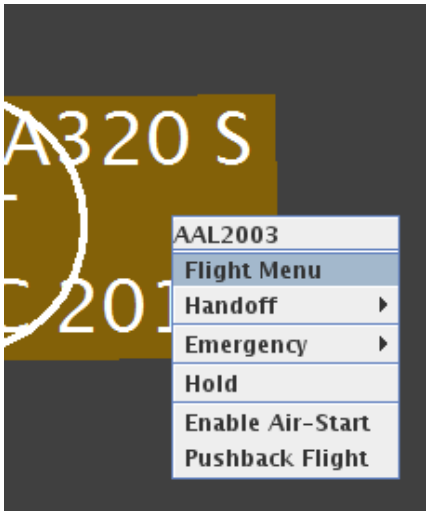
Heavy A330 inbound for Gate D2.

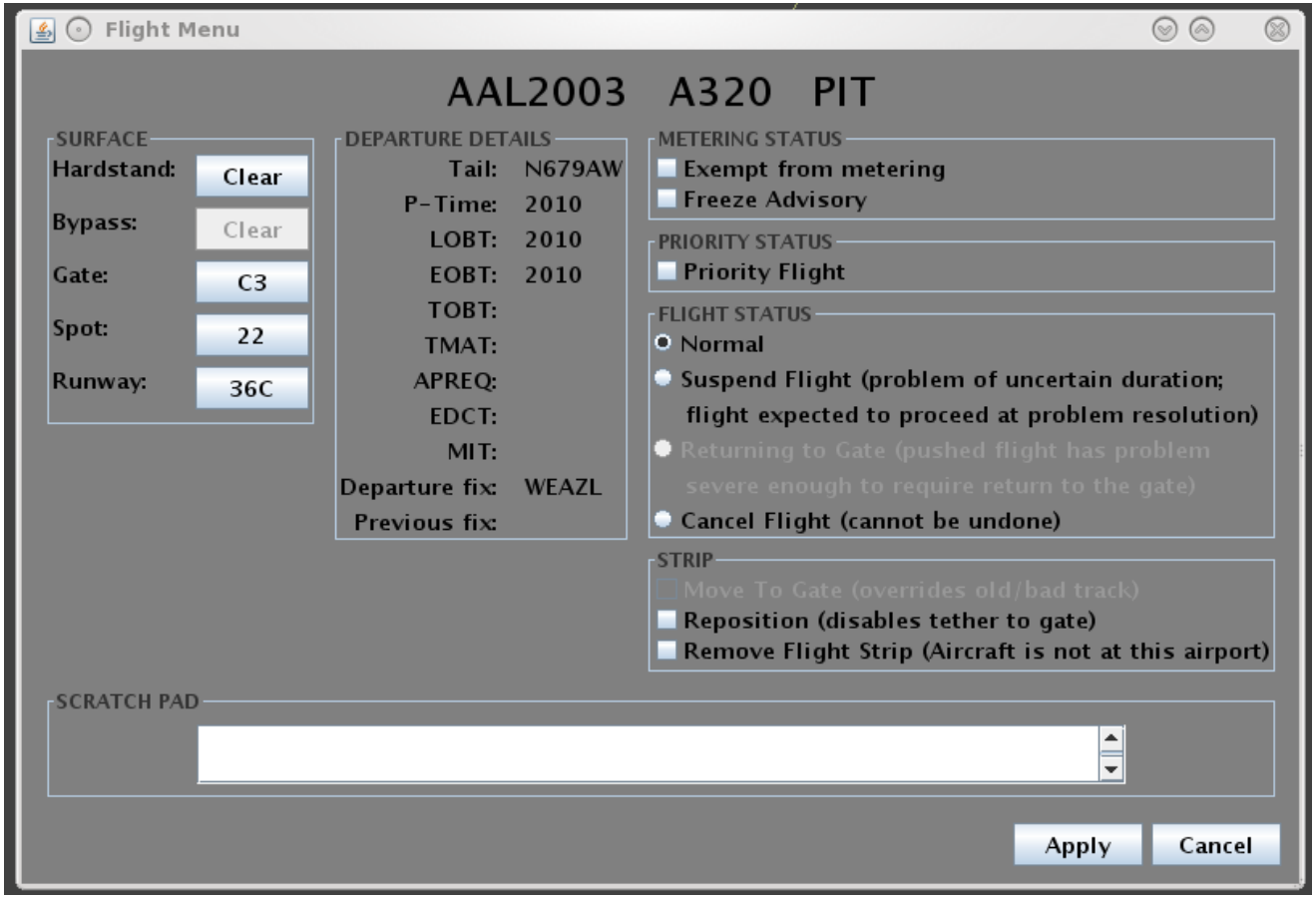
Aircraft parked at adjacent Gate D1.

Operational Use Case: Flight Menu

Flight Menu

- Provides an interface to change flight status, flight properties.
- Provides access to more schedule information.



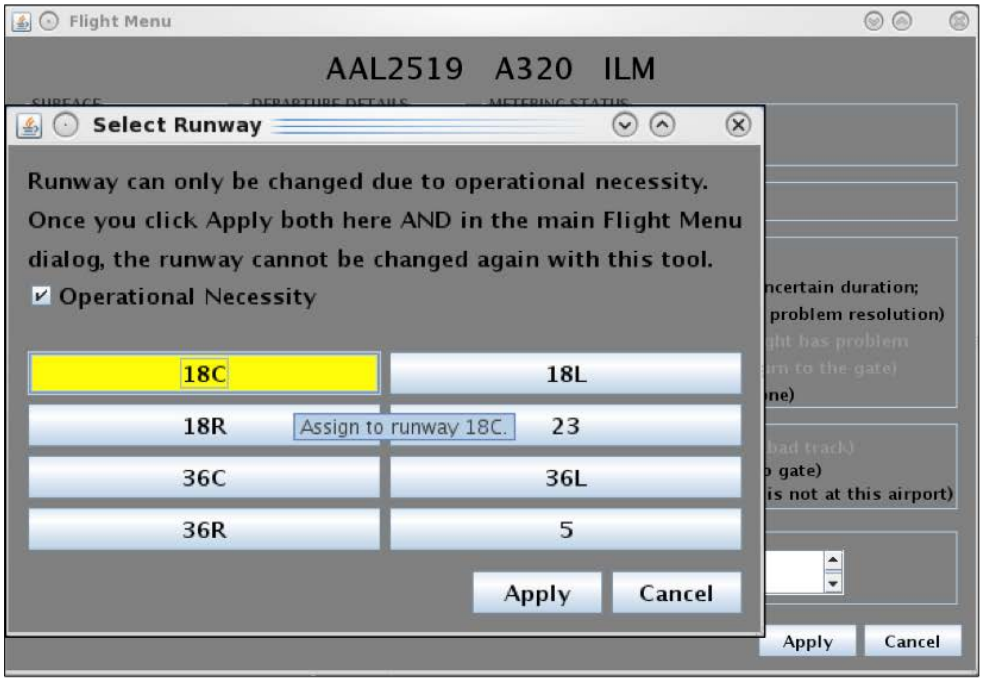


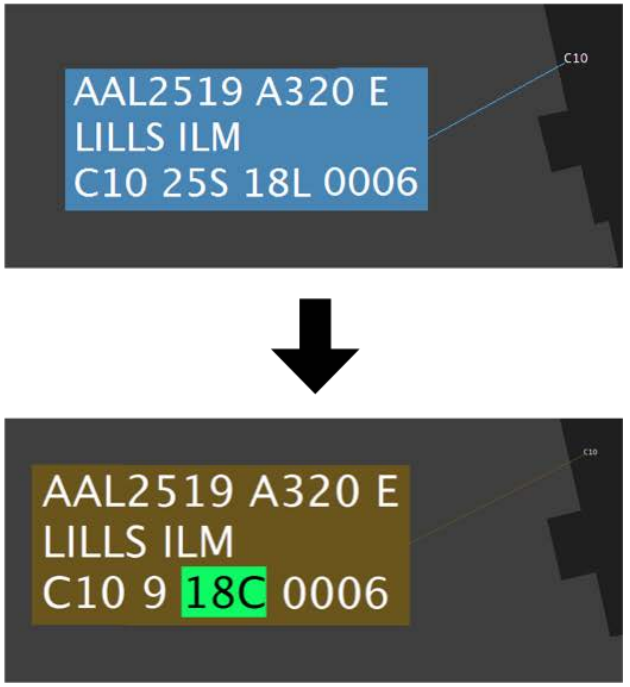
Operational Use Case: Op Nec

Runway Change for Operational Necessity

- At CLT, ATCT allows Ramp to input a change for Op Necessity
- Not applicable at all airports.

Data Exchange: **Ramp Input into RTC** → **ATC Tower (STBO)**

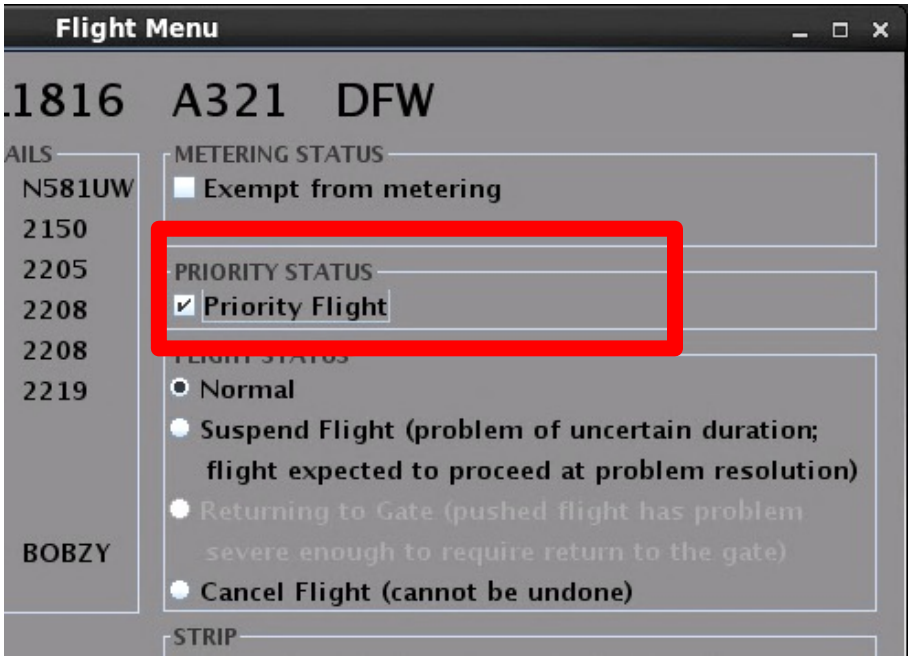


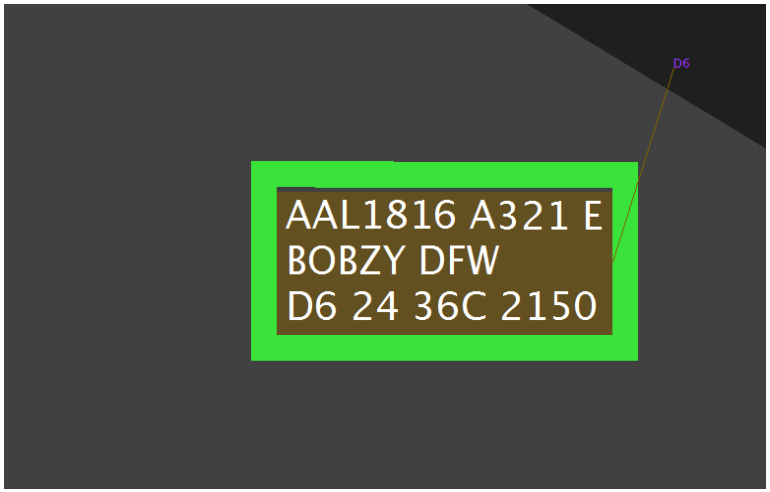


Operational Use Case: Priority

Priority Flight

- Ramp Manager/Ramp Controllers can designate a flight as a priority flight using the Flight Menu on the RTC.
- Priority flights are scheduled ahead of other flights within the same airline during Surface Metering.
- Ramp Manager can add a daily list on RMTC.

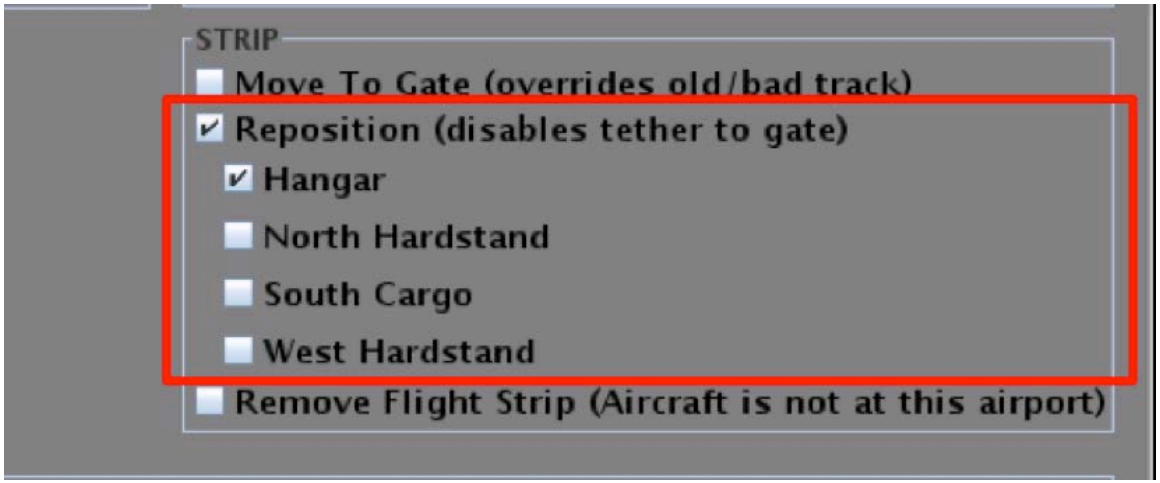


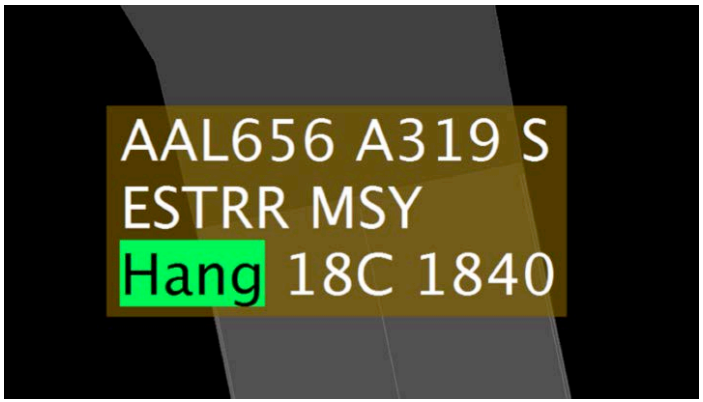


Operational Use Case: Reposition

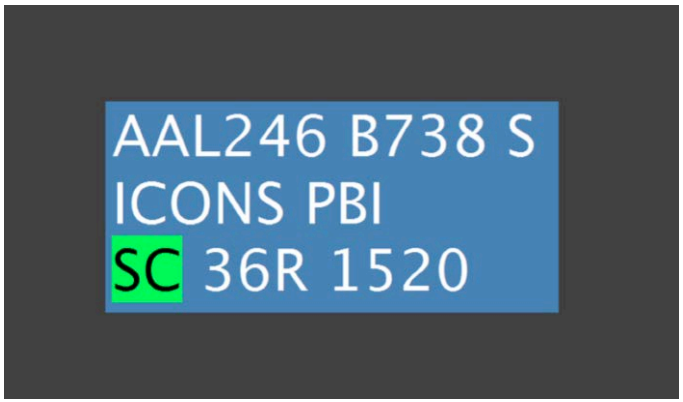
Reposition Flight

- Manage repositioned flights on RTC.





Hangar

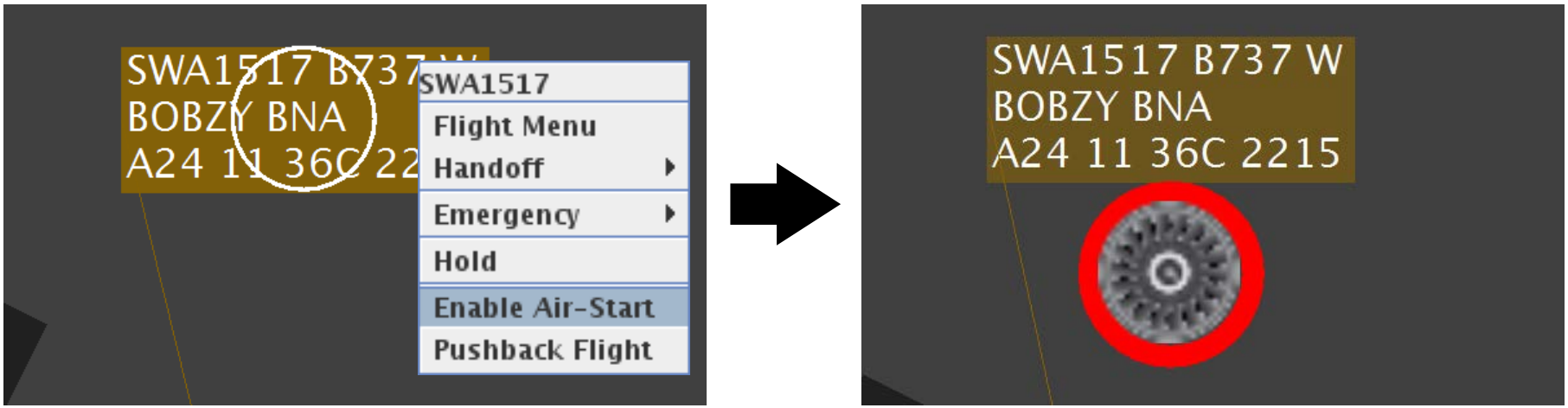


South Cargo

Operational Use Case: Enable Air Start

Air-Start

- Indicate flights that require an air-start in RTC
- Access from right-click menu.
- Engine icon with red border.

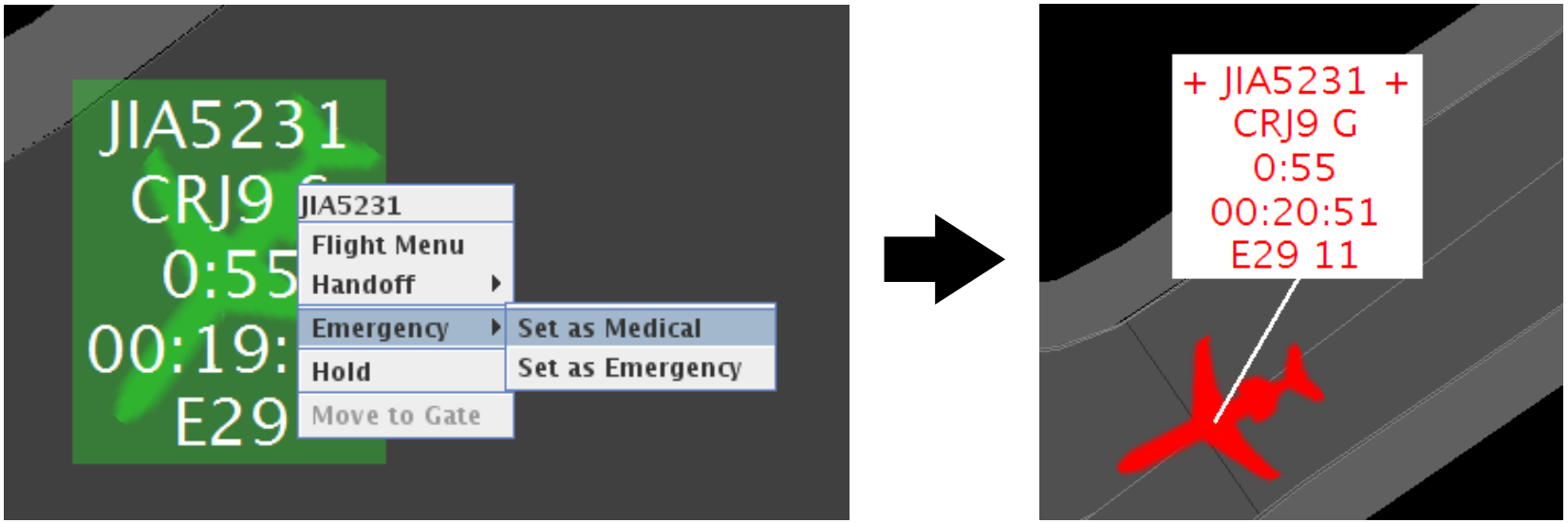


Operational Use Case: Emergency

Emergency

- Mark a flight for a general or medical emergency.

Data Exchange: **Ramp Input into RTC** ⇔ **ATC Tower (STBO)**

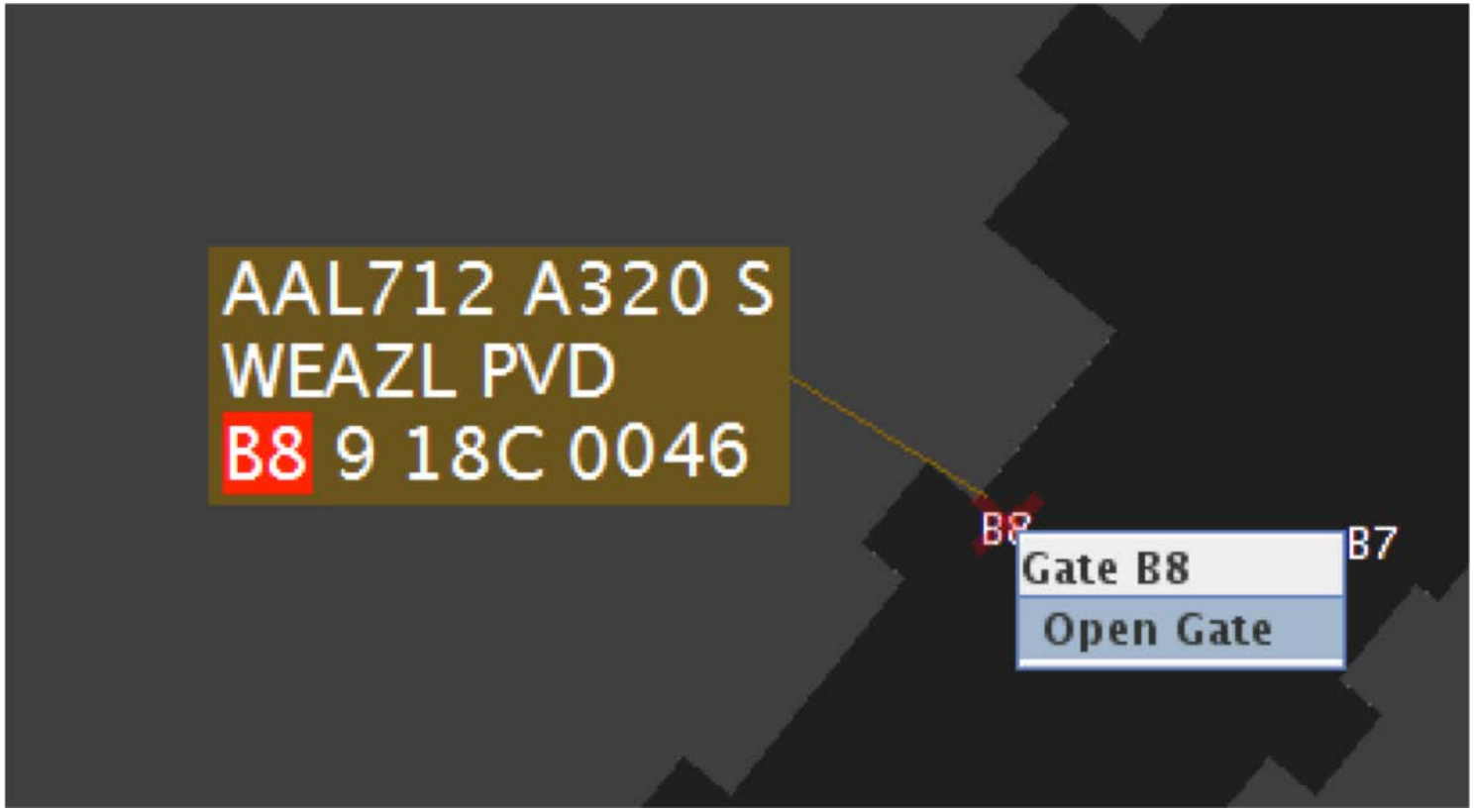


Emergency (Medical)

Operational Use Case: Gate Closure

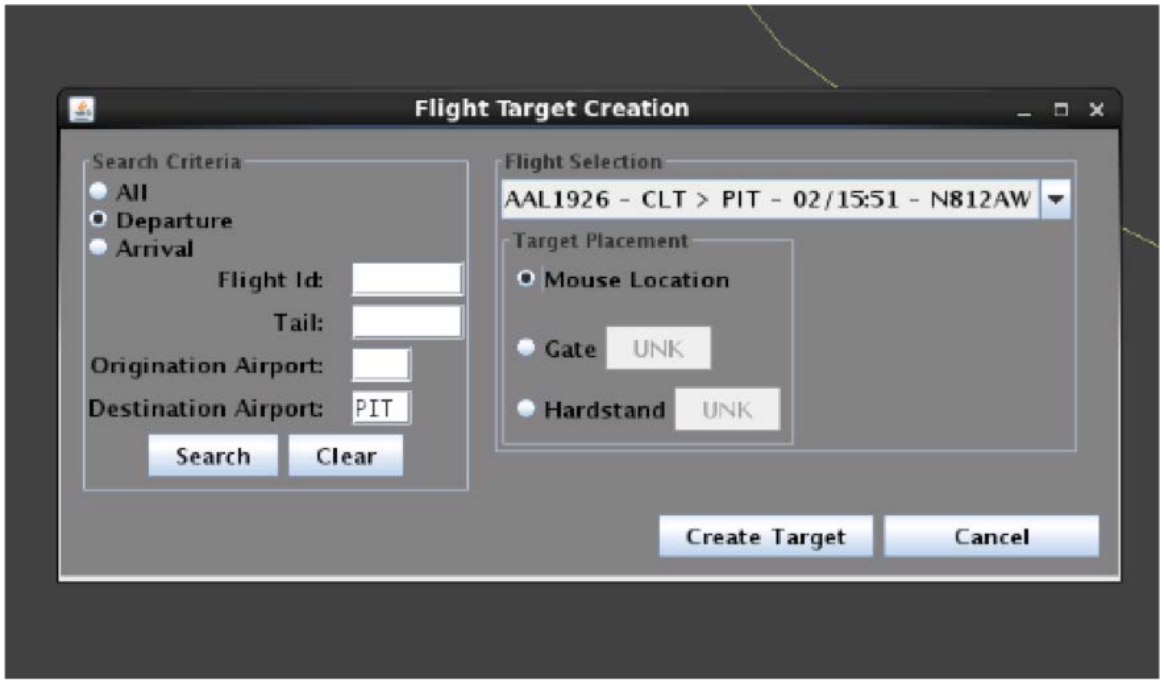
Gate Closure

- Indicate gate closures in RMTC.



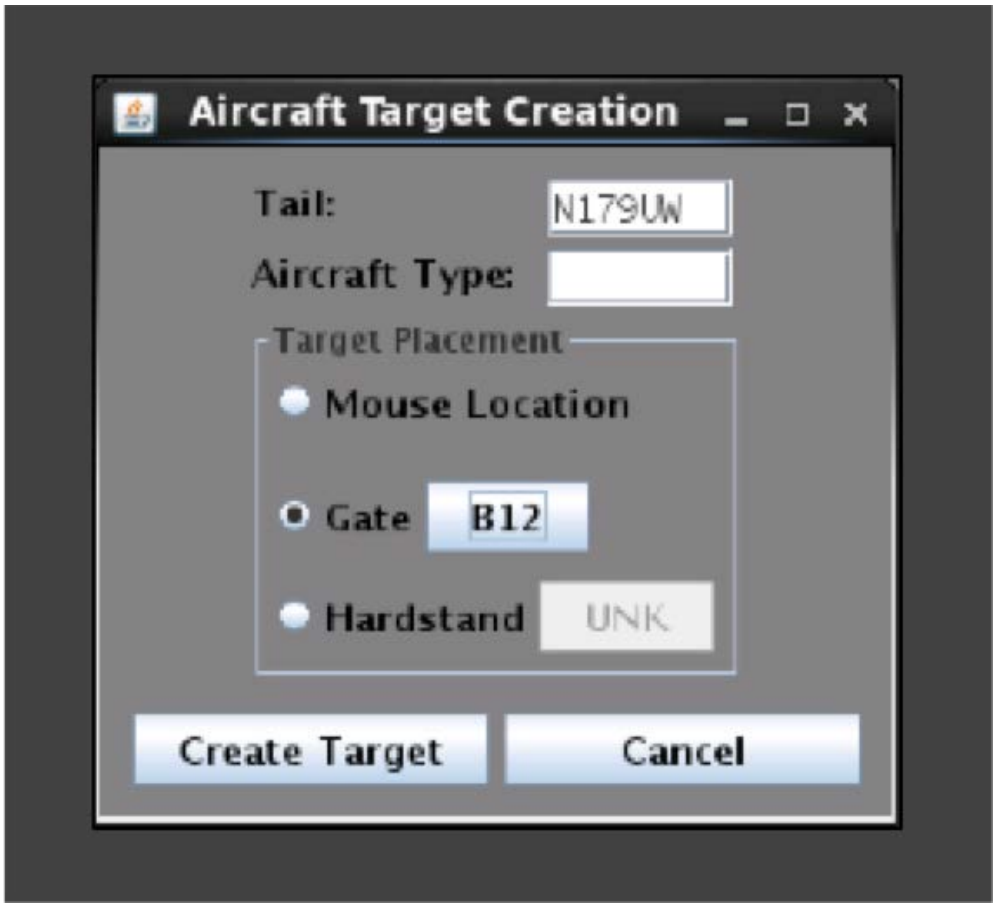
Operational Use Case: Add Flight Target

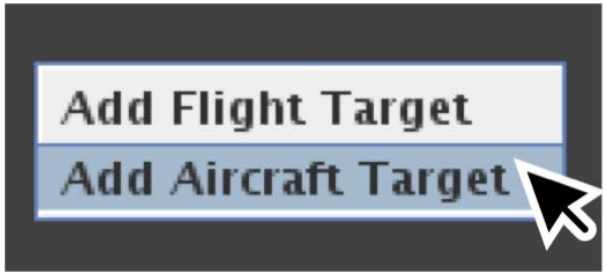
- Create flight strips for flights that are in the database, but missing from the RTC map.



Operational Use Case: Add Aircraft Target

- Create targets for aircraft not in the database.





ATD-2
Integrated Arrival/Departure/Surface

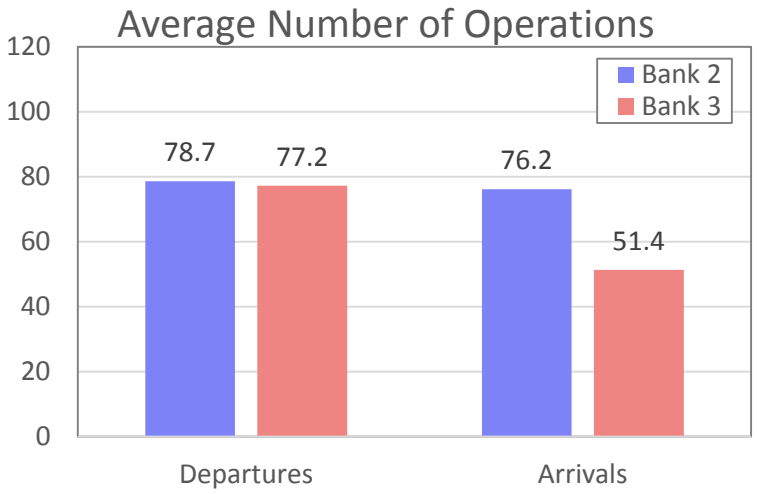
NASA

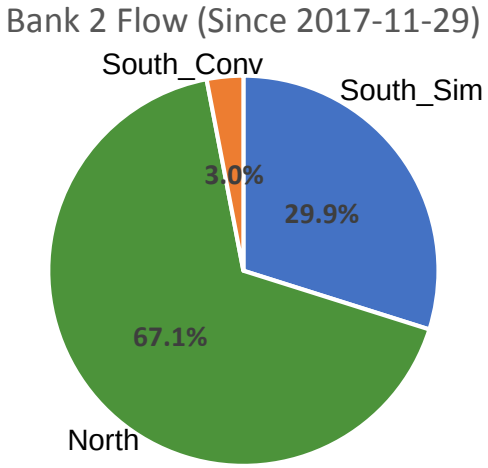
Q&A

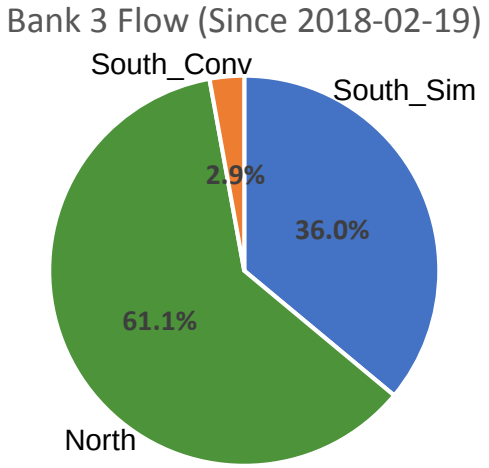
Backup Slides

Surface Metering Usage

- Surface metering started in late Nov 2017 (Phase 1C)
  - Bank 2 was metered in 419 of 548 (76.5%) days since 2017-11-29
  - Bank 3 was metered in 325 of 466 (69.7%) days since 2018-02-19
- Bank 2 and Bank 3 have similar number of departures
- Bank 2 has 48.3% more arrivals than Bank 3 which causes increased surface congestion



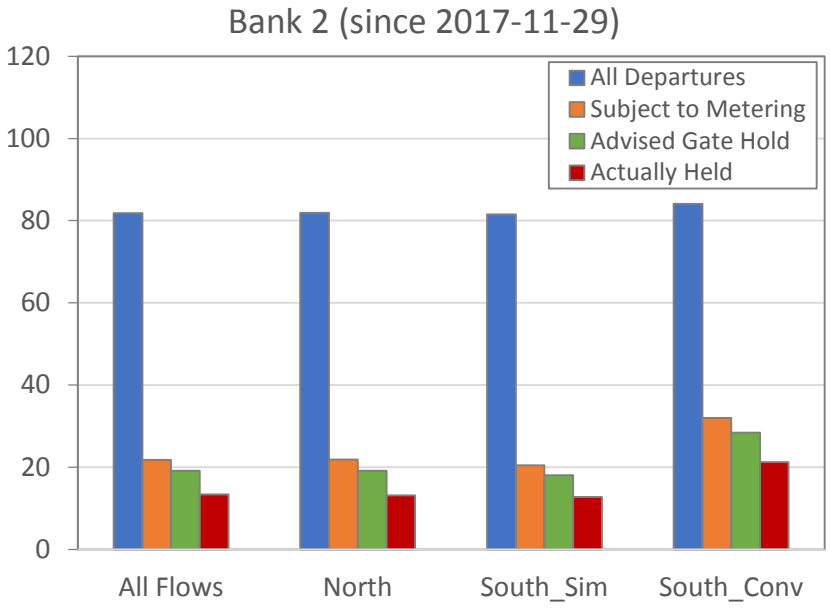


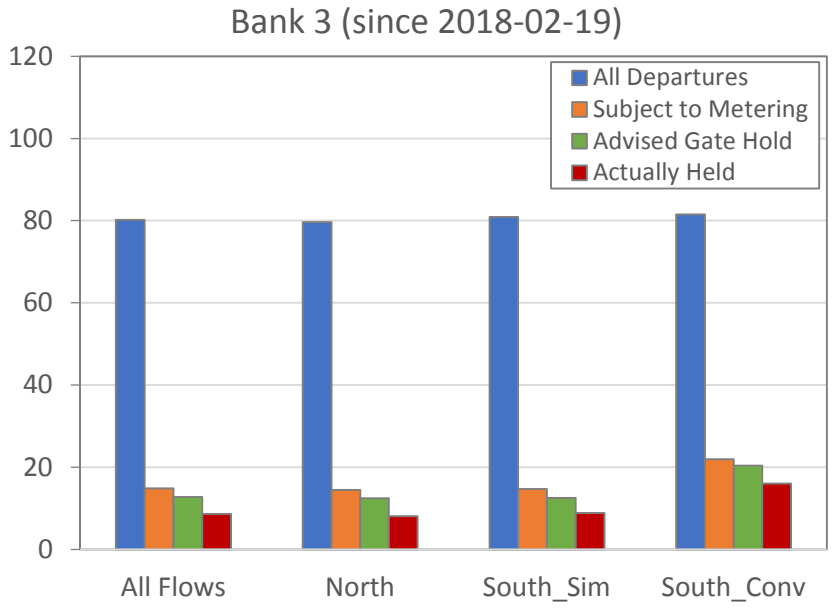


Avg. Number of Departures During Metering

- More departures were subject to metering and held at the gate in bank 2 compared to bank 3

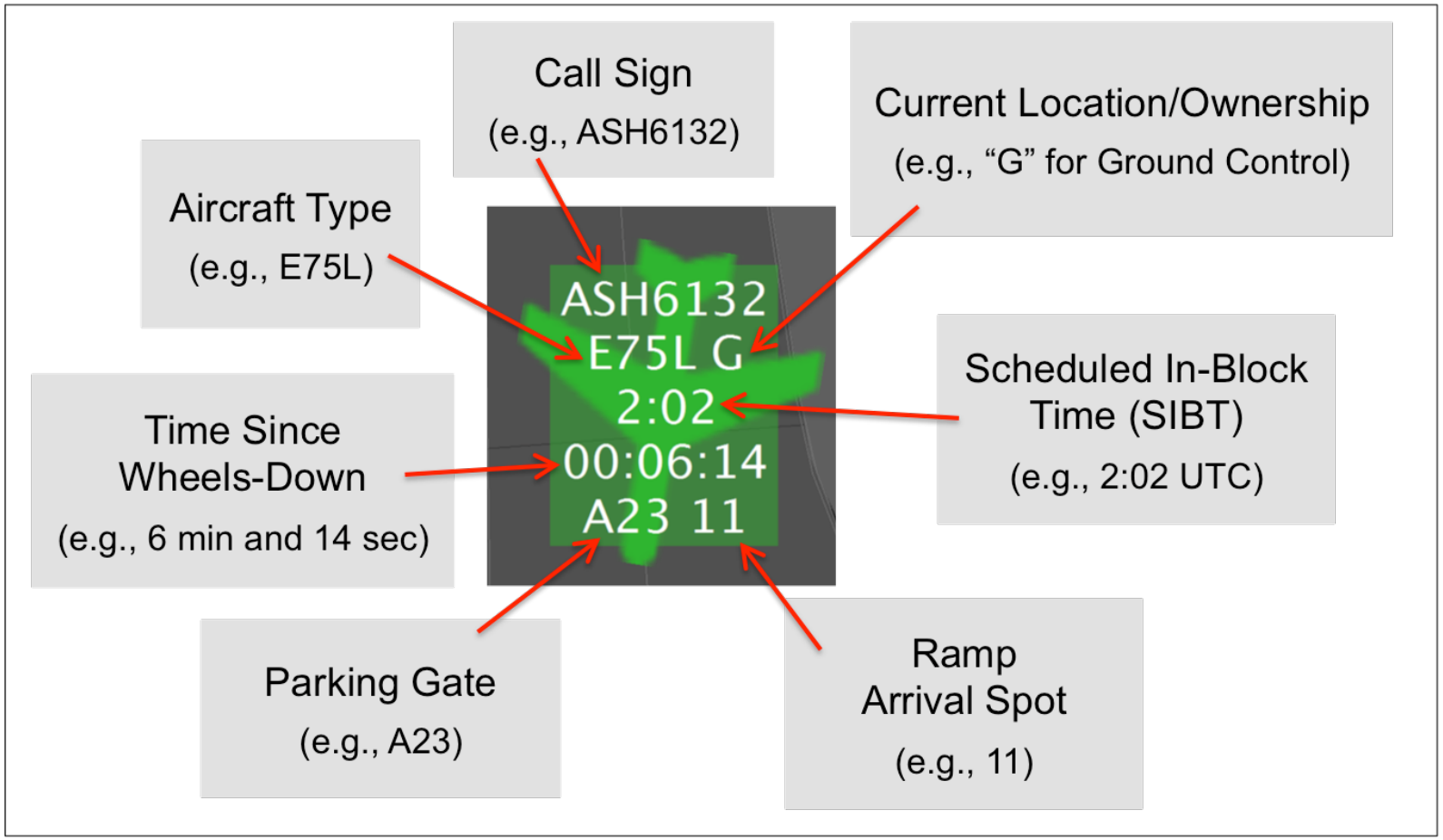
- Among all the departures in Bank 2 (Bank 3)
  - 26.7% (18.5%) of departures were subject to metering
  - 23.4% (15.9%) of departures were advised a gate hold
  - 16.3% (10.8%) were actually held at the gate





Features- Industry Example and RTC

- Arrival Data Tag / Flight Strip



RTC: Data Exchange and Integration

ATC Tower to Ramp	Ramp to ATC Tower	Both Directions
Airport Configuration and Runway Utilization	Runway Change for Operational Necessity	Gate Conflicts
Miles-In-Trail	Flight Cancellations	Return to Gates
EDCTs	Ramp Closure	Lengthy Taxi Delays
Approval Request / Call for Release	Aircraft Pushback	Metering Information
Departure Fix Closures	Flight Status	Long on Board / Tarmac Rule
Ground Stop	Spot Assignments	Emergency Flights
Runway Closures	Scratchpad Notes	
Runway Changes		