Airspace Technology Demonstration 2 (ATD-2)

Understand and Process ATC Restrictions in the National Airspace System

April 25, 2018

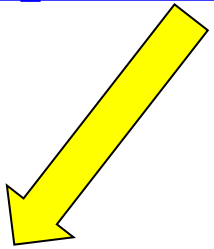
Bob Staudenmeier

ATD-2 Remote Demo Objectives

- Keep broad group of ATD-2 stakeholders informed of progress in an inexpensive and unobtrusive manner
- Demonstrate actual system capability and lessons learned (as opposed to documents/plans)
- Take input from stakeholders that can be used to improve the ATD-2 system, processes and/or outreach
- Identify areas where more detailed discussion is desired/warranted

Upcoming Demos!

Go to https://www.aviationsystemsdivision.arc.nasa.gov/research/tactical/atd2_remote_demos.shtml to learn about upcoming ATD-2 remote demos!



ATD-2 Remote Demos

To Join…

1. Go to: **https://ac.arc.nasa.gov/atd2/**
   Enter as a guest and type your name. NASA Employees can log-in with their email and password (NDC Credentials).
2. Dial the Telecon Number: **1-844-467-6272, Passcode: 592382#**

Demo Objectives

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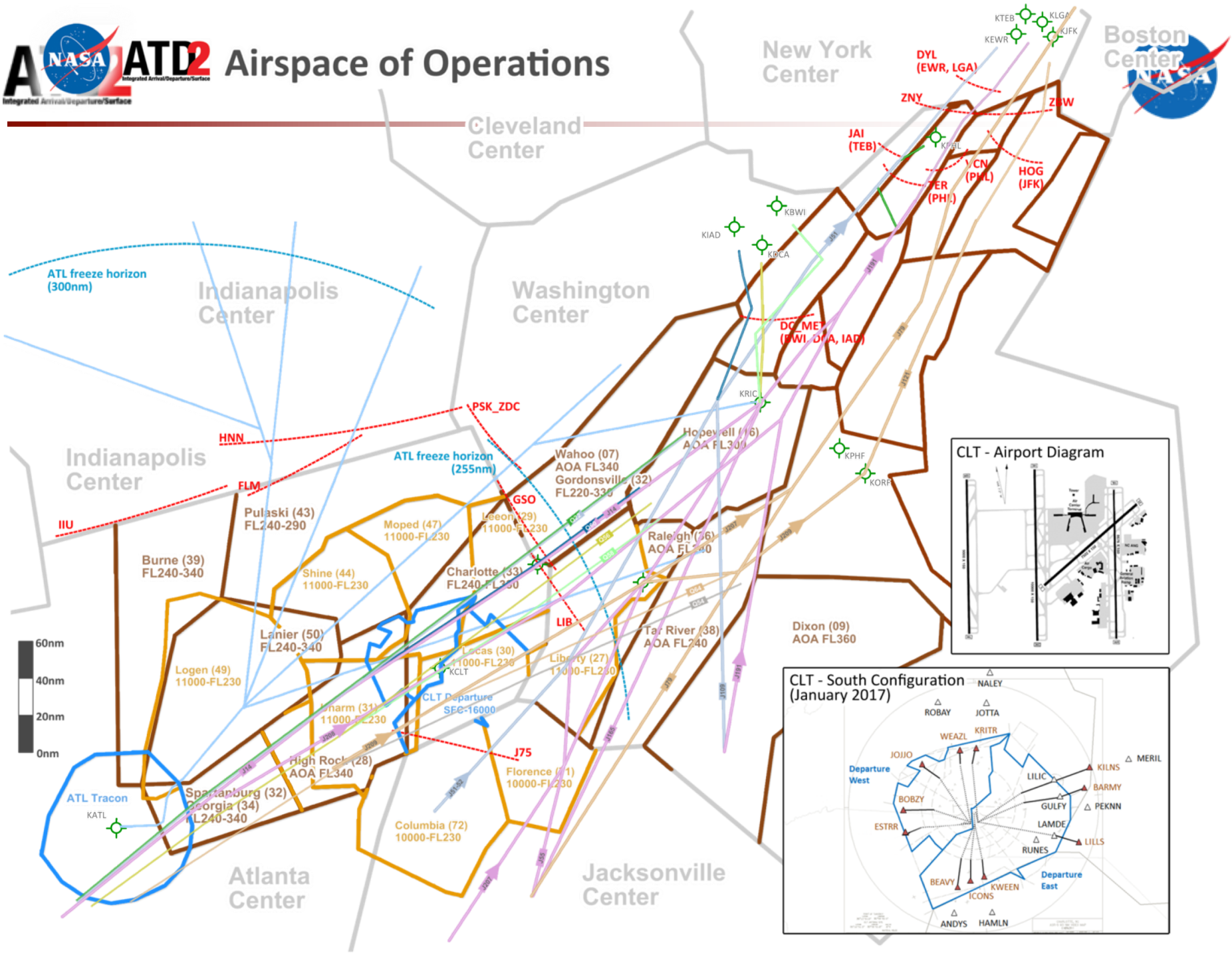
Upcoming Demos

Latest IADS capabilities	Mar. 14, 8:00-9:30 PT
Surface Metering - Initial Analysis, Impact, and Evolution	Mar. 21, 8:00-9:30 PT

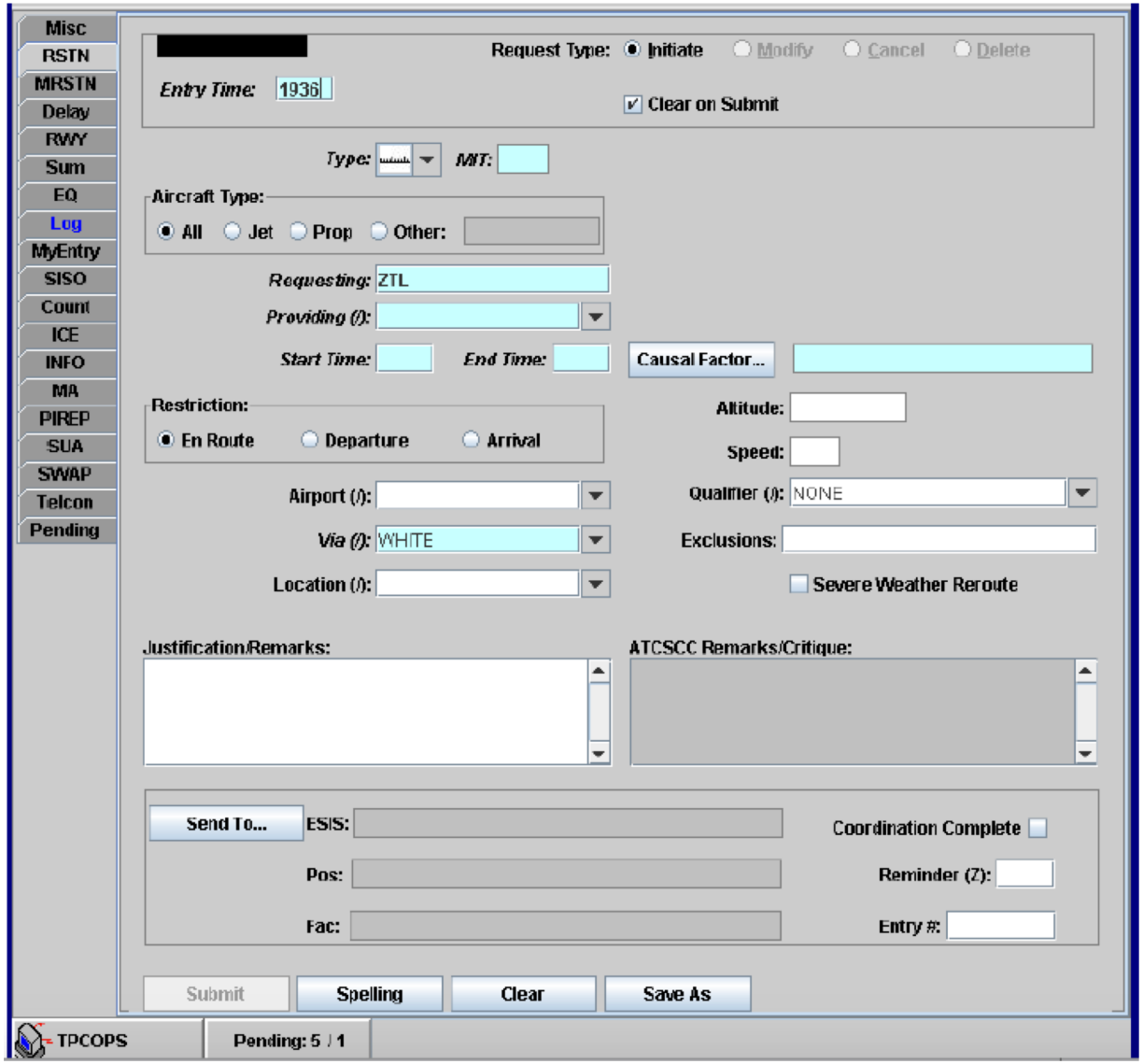
Demo Recordings

- The audio and video from this demo are being recorded

Airspace of Operations



National Traffic Management Log (NTML) Restriction



N90 Requests 15 MIT to LGA

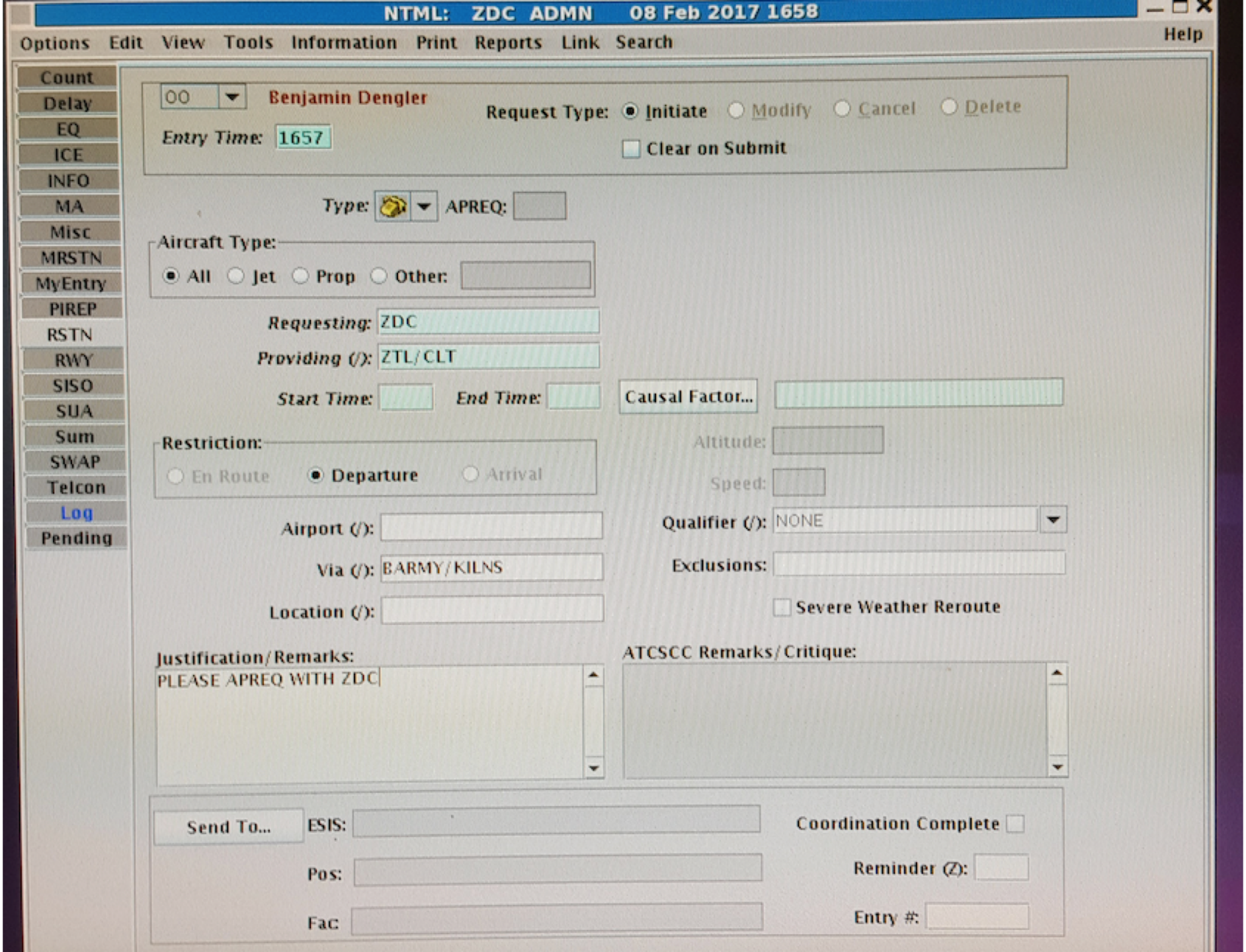
```
1015     ZDC/CP     LGA Arivl via RBV 15 Mit                                    NN
                    1100-0200, VOL:Arrival Demand
                    N90:ZDC, RSTN: APVD 1013/DCC:NE/JM - LNK: LGA - ESIS:
```

ZDC Pass Back MIT to ZTL

1038 ZDC/CP LGA EnRte via J14,Q60 30 Mit JETS AS ONE RTE, FEA_ZTL NN
1200-1500, VOL:Volume
ZDC:ZTL, RSTN: APVD 1037/DCC:NE/JM - LNK: LGA - ESIS:
CP,Bay2,Bay5

General Information (GI) Message

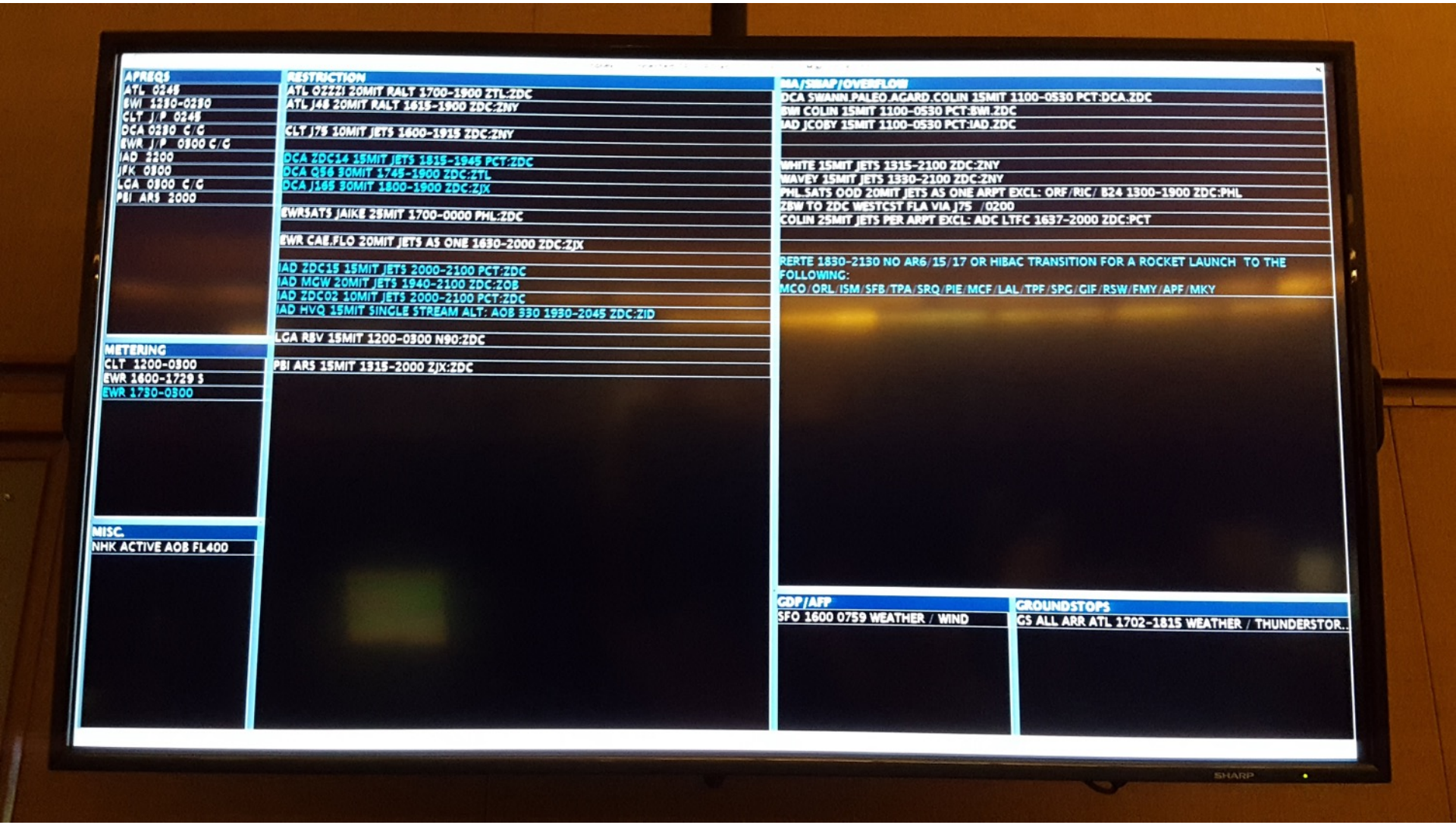
```
1411 GI E2 ATTN FLM/CIC/SCTRS/TWRS.  APREQ JETS/PROPS TO THE FOLLOWING
DESTINATIONS  XXX  XXXX-XXXXZ WITH ZDC... IDAC TWRS CALL FOR RELEASE
TMU
```


NTML: ZDC ADMN 08 Feb 2017 1658
Options Edit View Tools Information Print Reports Link Search
Help
Count
Delay
EQ
ICE
INFO
MA
Misc
MRSTN
MyEntry
PIREP
RSTN
RWY
SISO
SUA
Sum
SWAP
Telcon
Log
Pending
00
Benjamin Dengler
Request Type: Initiate Modify Cancel Delete
Entry Time: 1657
Clear on Submit
Type:
APREQ:
Aircraft Type:
All Jet Prop Other:
Requesting: ZDC
Providing (/): ZTL/CLT
Start Time:
End Time:
Causal Factor...
Restriction:
En Route Departure Arrival
Altitude:
Speed:
Airport (/):
Qualifier (/): NONE
Via (/): BARMY/KILNS
Exclusions:
Location (/):
Severe Weather Reroute
Justification/Remarks:
PLEASE APREQ WITH ZDC
ATCSCC Remarks/Critique:
Send To...
ESIS:
Coordination Complete
Pos:
Reminder (Z):
Fac
Entry #:

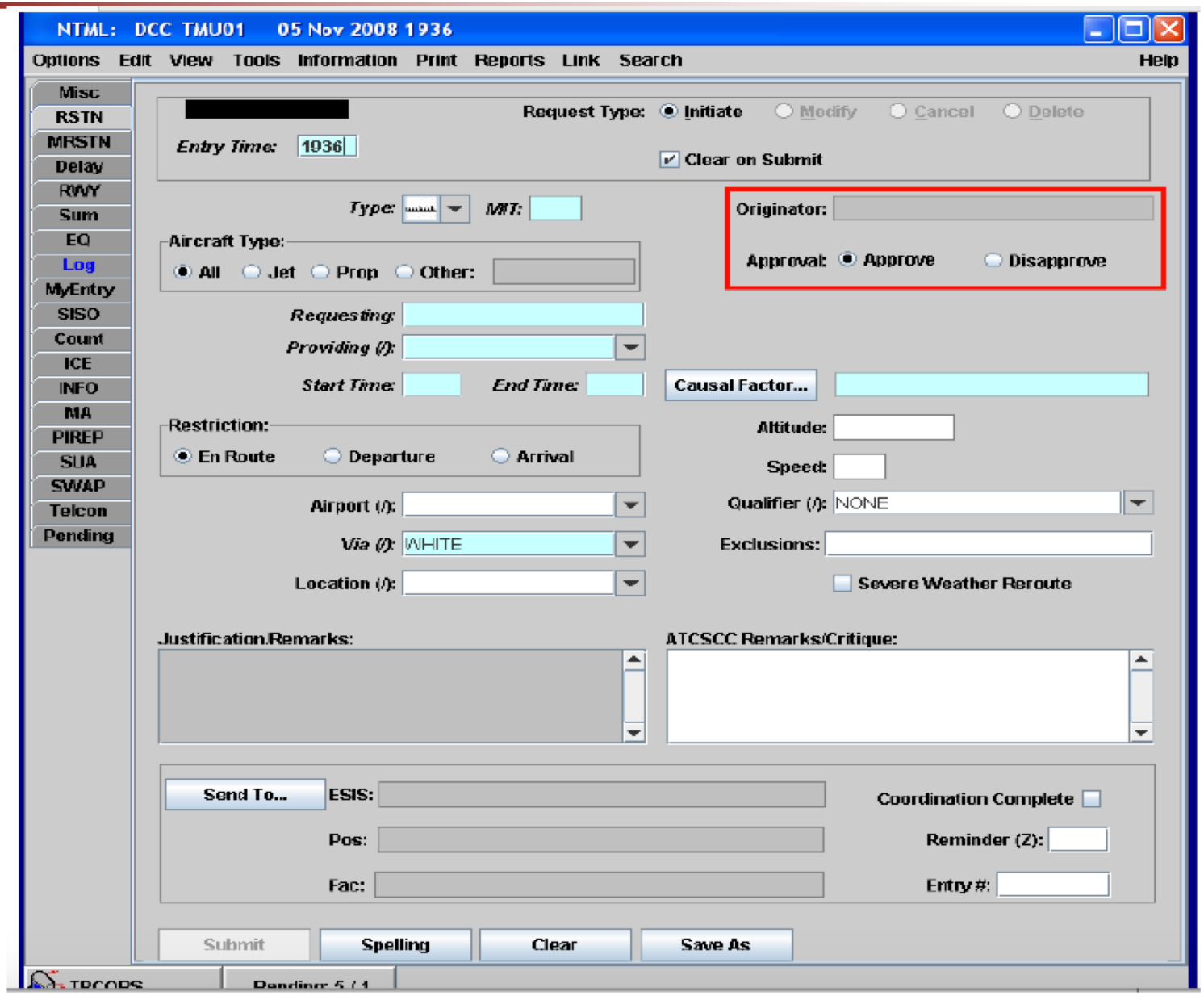
ZDC Places CLT on APREQ

```
1016    ZDC/CP    APREQ: CLT,ZTL to LGA via BARMY,KILNS, PLEASE APREQ WITH ZDC  NN
                  ESP.   THANKS
                  1030-0200, VOL:Volume
                  ZDC:CLT,ZTL, APREQ: - LNK: LGA,CLT
```

ESIS Board at ZDC



Command Center Must Approve Most Restrictions



OIS Page

ATCSCC
OIS
SYSTEM

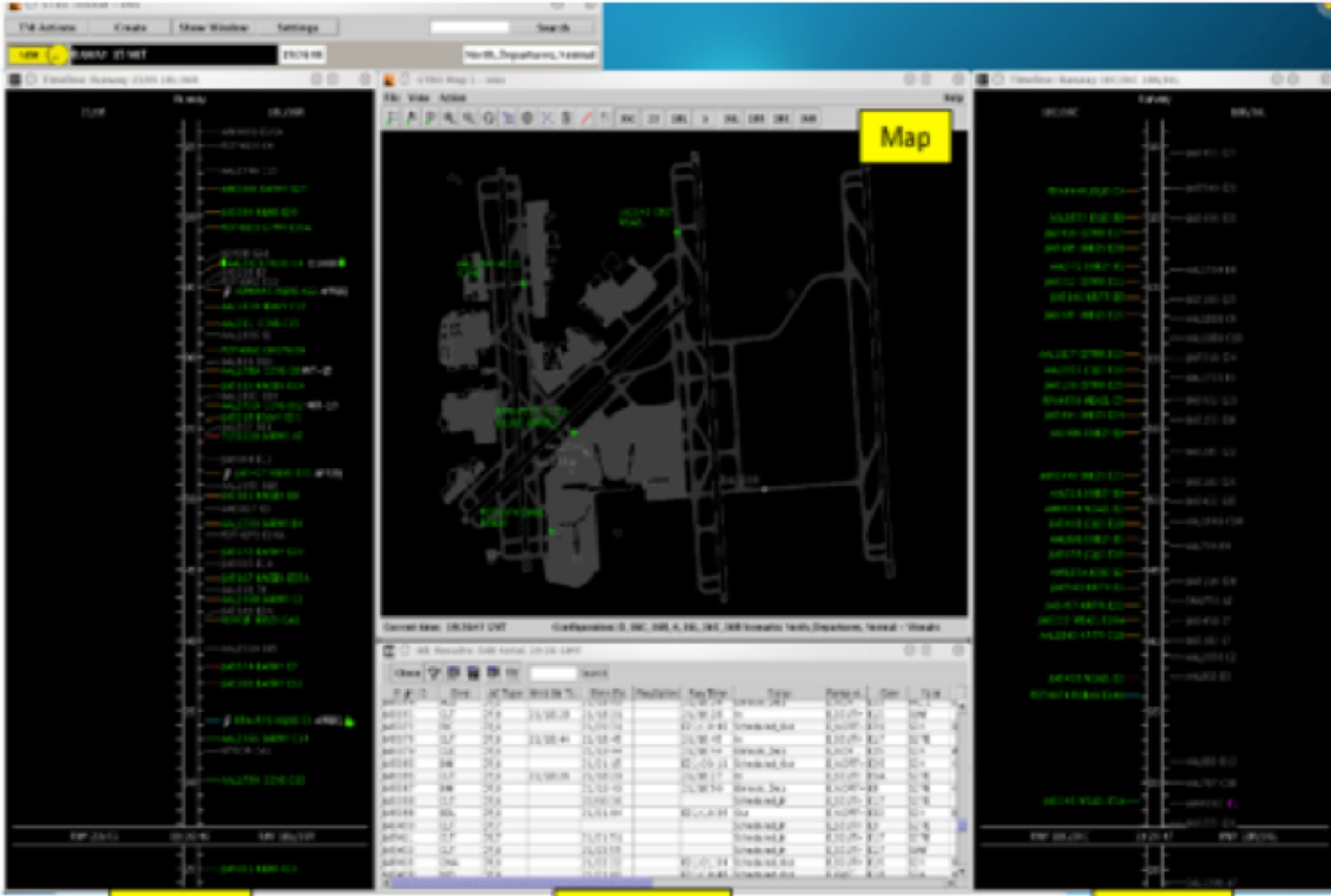
3/29/2018

OIS Main Menu
- NAS Status
- Int'l Status
- East Directory
  - ZBW
  - ZDC
    - BWI
    - DCA
    - IAD
    - RDU
  - ZID
  - ZJX
  - ZMA
  - ZNY
  - ZOB
  - ZSU
  - ZTL
- West Directory

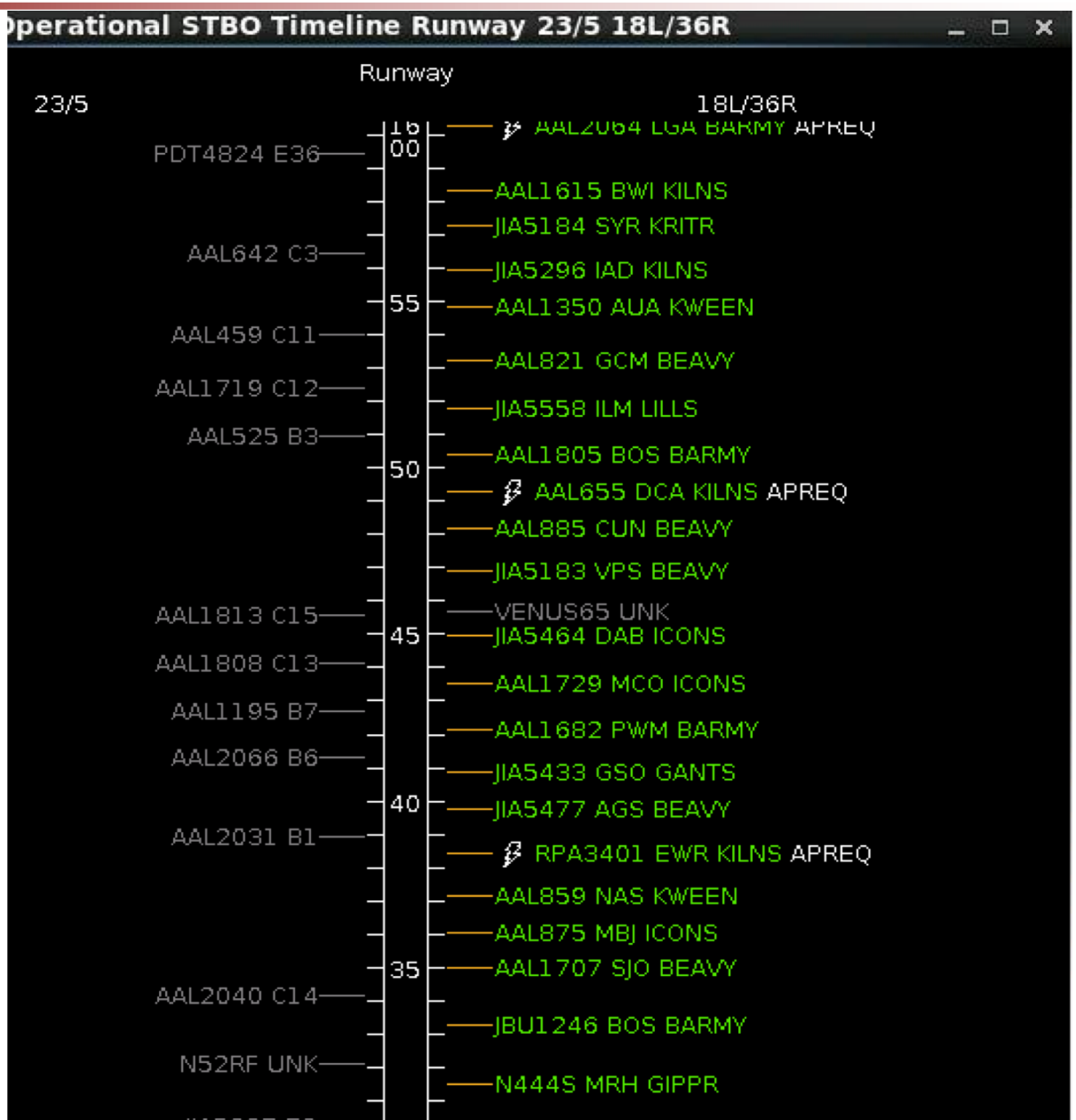
Current Restrictions

This page refreshes every minute. Last updated Thu, 29 Mar 2018 13:52:34 UTC

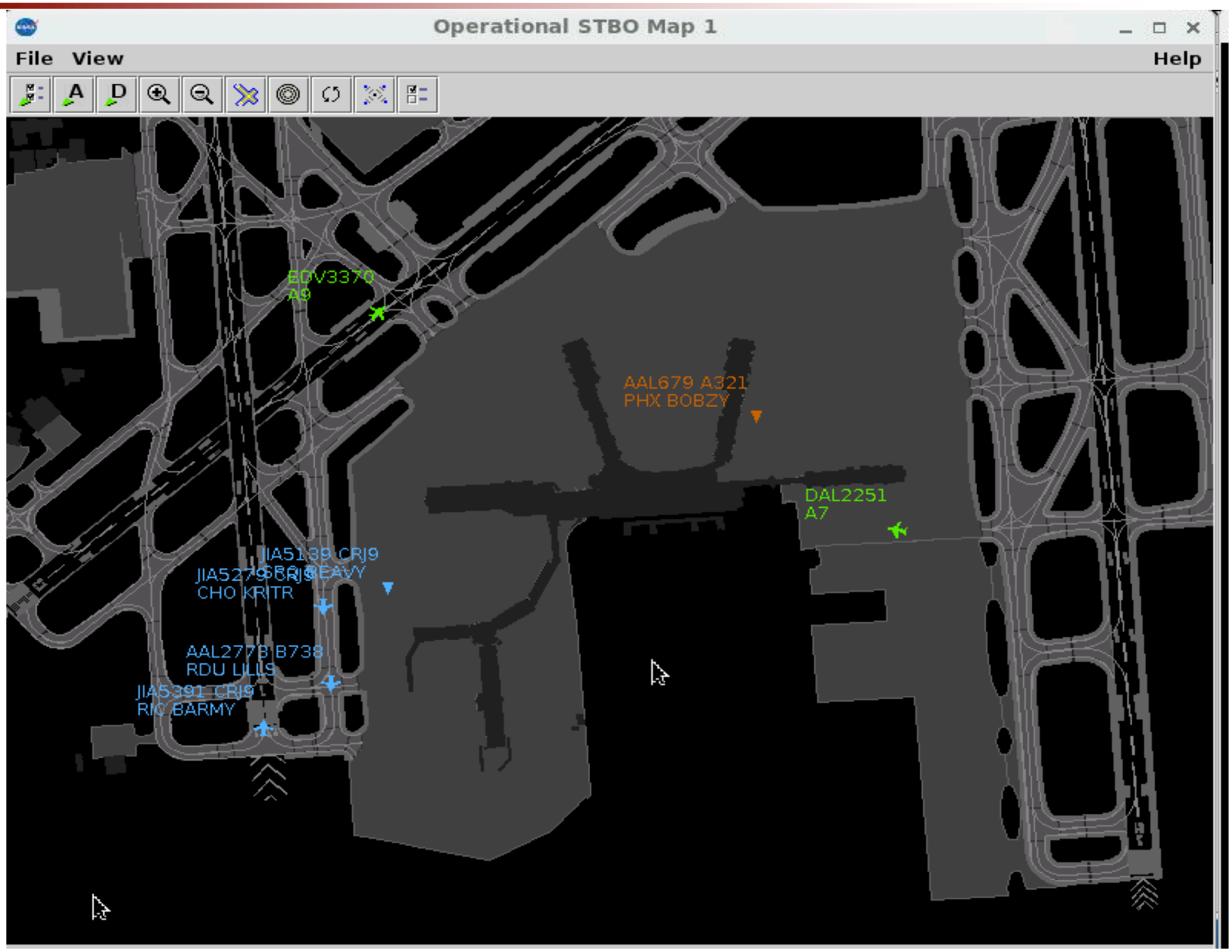
REQUESTING	PROVIDING	RESTRICTION	START TIME	STOP TIME
ZDC	CLT/ZTL	APREQ CLT,ZTL to DCA via BARMY,KILNS JETS 1030-0130 ZDC:CLT,ZTL	03/29/2018 1030	03/30/2018 0130
ZDC	CLT/ZTL	APREQ CLT,ZTL to EWR via BARMY,KILNS JETS 1100-0130 ZDC:CLT,ZTL	03/29/2018 1100	03/30/2018 0130
ZDC	CLT/ZTL	APREQ CLT,ZTL to LGA via BARMY,KILNS JETS 1100-0130 ZDC:CLT,ZTL	03/29/2018 1100	03/30/2018 0130
ZDC	PCT	BWI GVE 20MIT JETS EXCL: SBV 1250-1800 ZDC:PCT	03/29/2018 1250	03/29/2018 1800
ZDC	PCT	BWI OTTTO 15MIT JETS 1145-1500 ZDC:PCT	03/29/2018 1145	03/29/2018 1500
ZDC	PCT	COLIN 20MIT JETS PER ARPT EXCL: ZDC LTFC 1200-1500 ZDC:PCT	03/29/2018 1200	03/29/2018 1500
ZDC	PCT	DCA,IAD GVE 15MIT JETS AS ONE ARPT EXCL: SBV 1250-1800 ZDC:PCT	03/29/2018 1250	03/29/2018 1800
ZDC	PCT	DCA,IAD OTTTO 10MIT JETS AS ONE ARPT 1145-1500 ZDC:PCT	03/29/2018 1145	03/29/2018 1500
ZDC	PHL	PHL,SATS OOD 20MIT JETS AS ONE ARPT EXCL: ZDC LTFC / B24 1200-1530 ZDC:PHL	03/29/2018 1200	03/29/2018 1530
ZDC	ZBW	DCA ZIZZI 20MIT JETS 1030-1445 ZDC:ZBW	03/29/2018 1030	03/29/2018 1445
ZDC	ZID	DCA BKW 20MIT SINGLE STREAM 1030-1430 ZDC:ZID	03/29/2018 1030	03/29/2018 1430
ZDC	ZNY	ATL J48 10MIT 1030-1800 ZDC:ZNY	03/29/2018 1030	03/29/2018 1800


Map
Timeline
Flights Table
Timeline

STBO Timeline



STBO Map


Operational STBO Map 1
File View Help
EDV3370
A9
AAL679 A321
PHX BOBZY
DAL2251
A7
JIA5139 CRJ9
JIA5279 CRJ9
CHO KRITR
AAL2778 B738
RDU LILLS
JIA5391 CRJ9
RIC BARMY

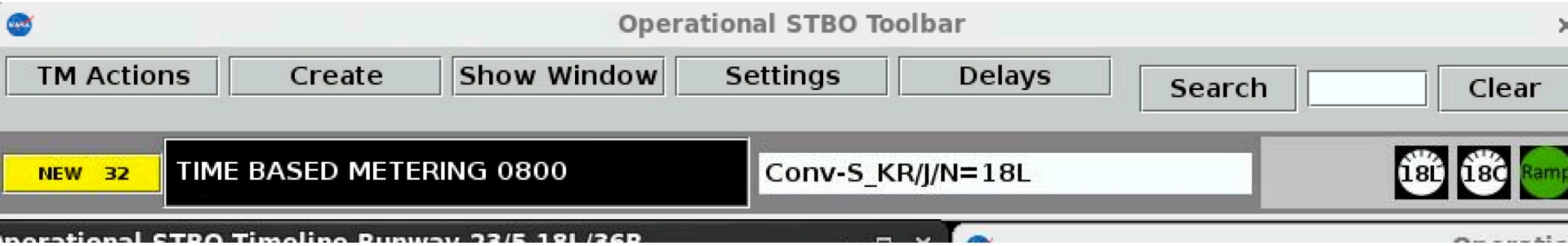
STBO Flights Table

Operational STBO Arr/Dep = Departure; Destination has APREQ = Yes; Has AOFF = No; Gate

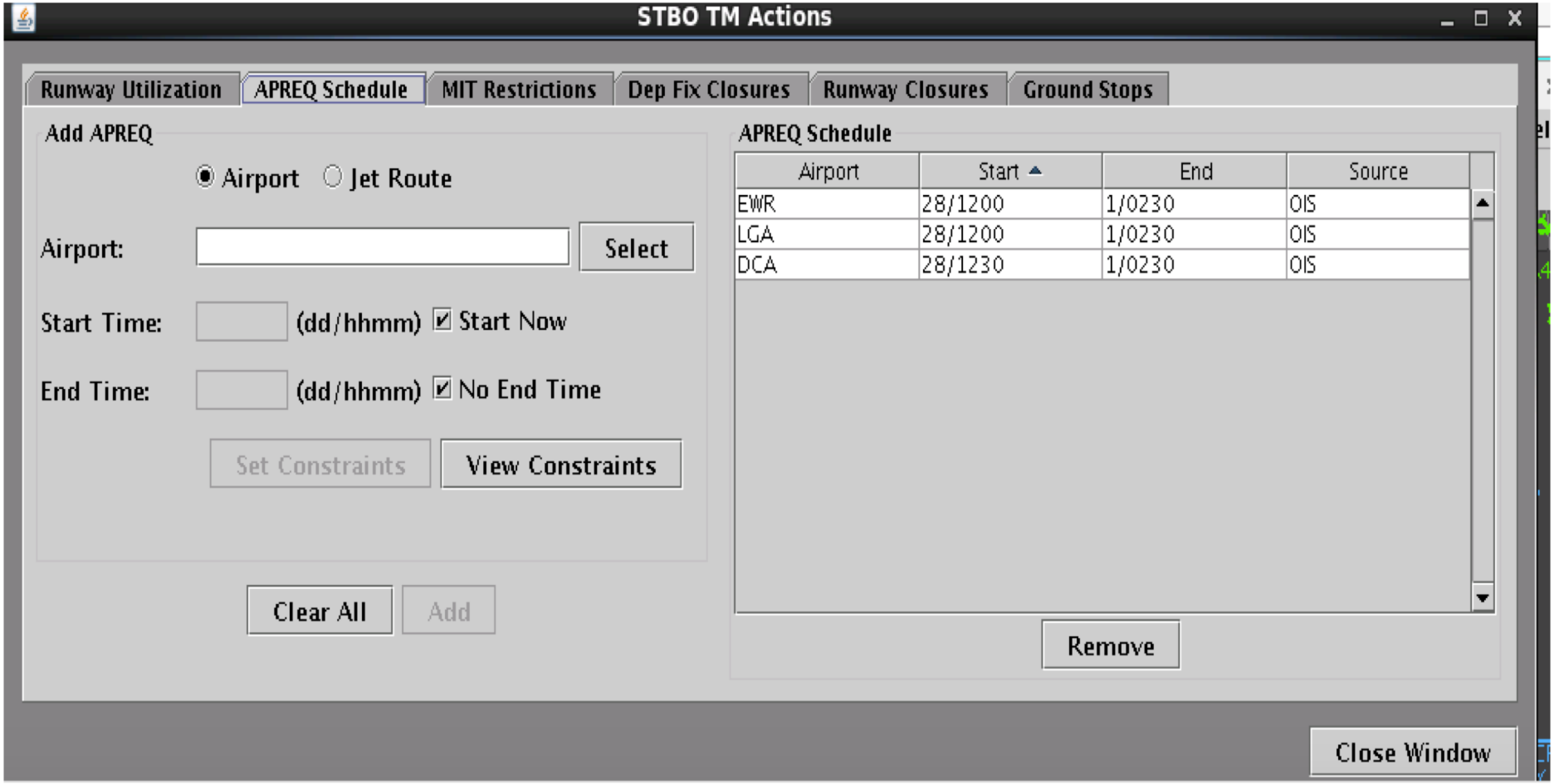
Search | Clear

Flight ID	Dest	Dep Fix	Swap	AC Type	Gate	EOBT ▲	AOBT	Flight Status	APREQ Requ...	APREQ	EDCT
RPA3401	EWR	KILNS		E170	A13			Scheduled_Out		APRQ	
ASQ5469	LGA	BARMY		CRJ7	A5			Scheduled_Out		APRQ	
AAL655	DCA	KILNS		A319	B2	30/15:29		Scheduled_Out		APRQ	
AAL2064	LGA	BARMY		A320	C19	30/15:34		Scheduled_Out		APRQ	
JIA5545	ATL	BOBZY		CRJ9	E30	30/15:49		Scheduled_Out		APRQ	

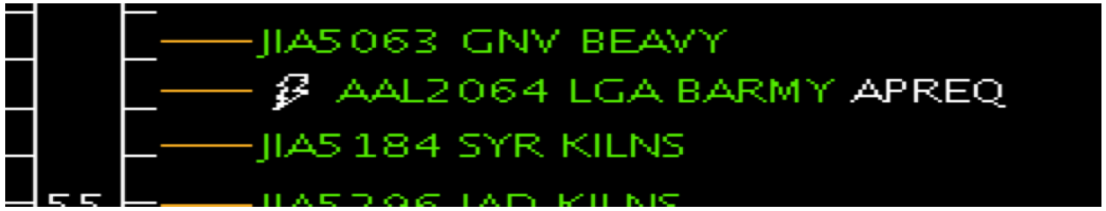
STBO Toolbar



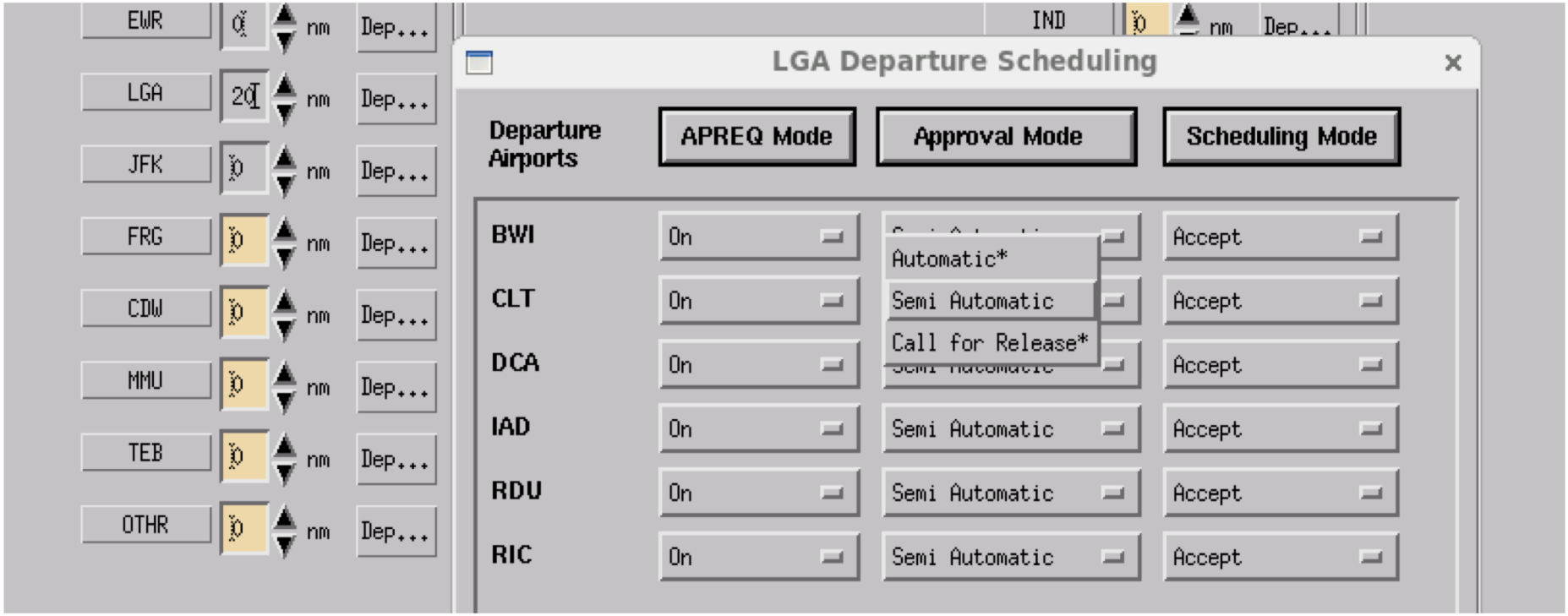
STBO Reflects LGA on APREQ



STBO Reflects LGA on APREQ

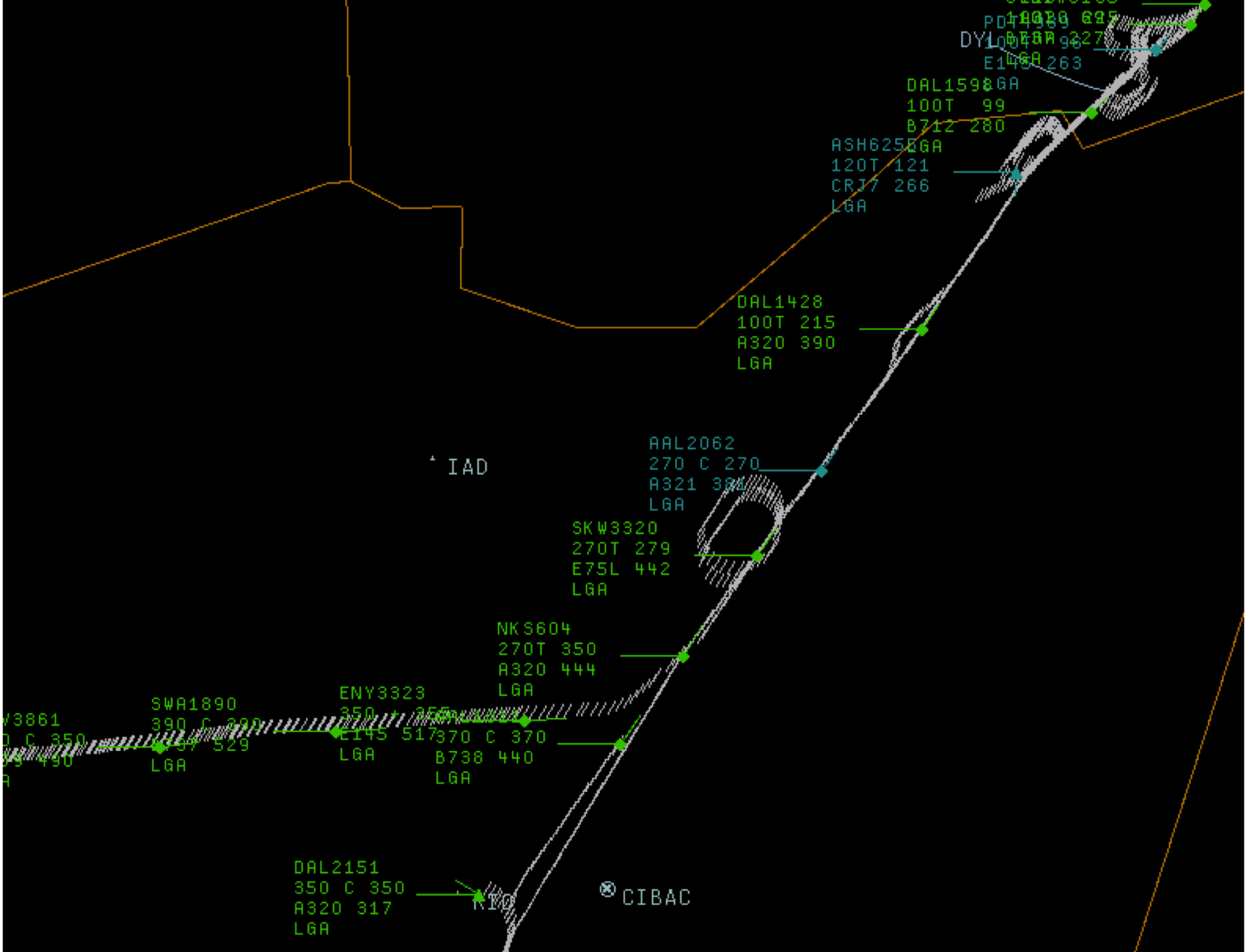


ZDC TMC Sets up EDC for MIT and IDAC Scheduling



NTML Message- Holding LGA

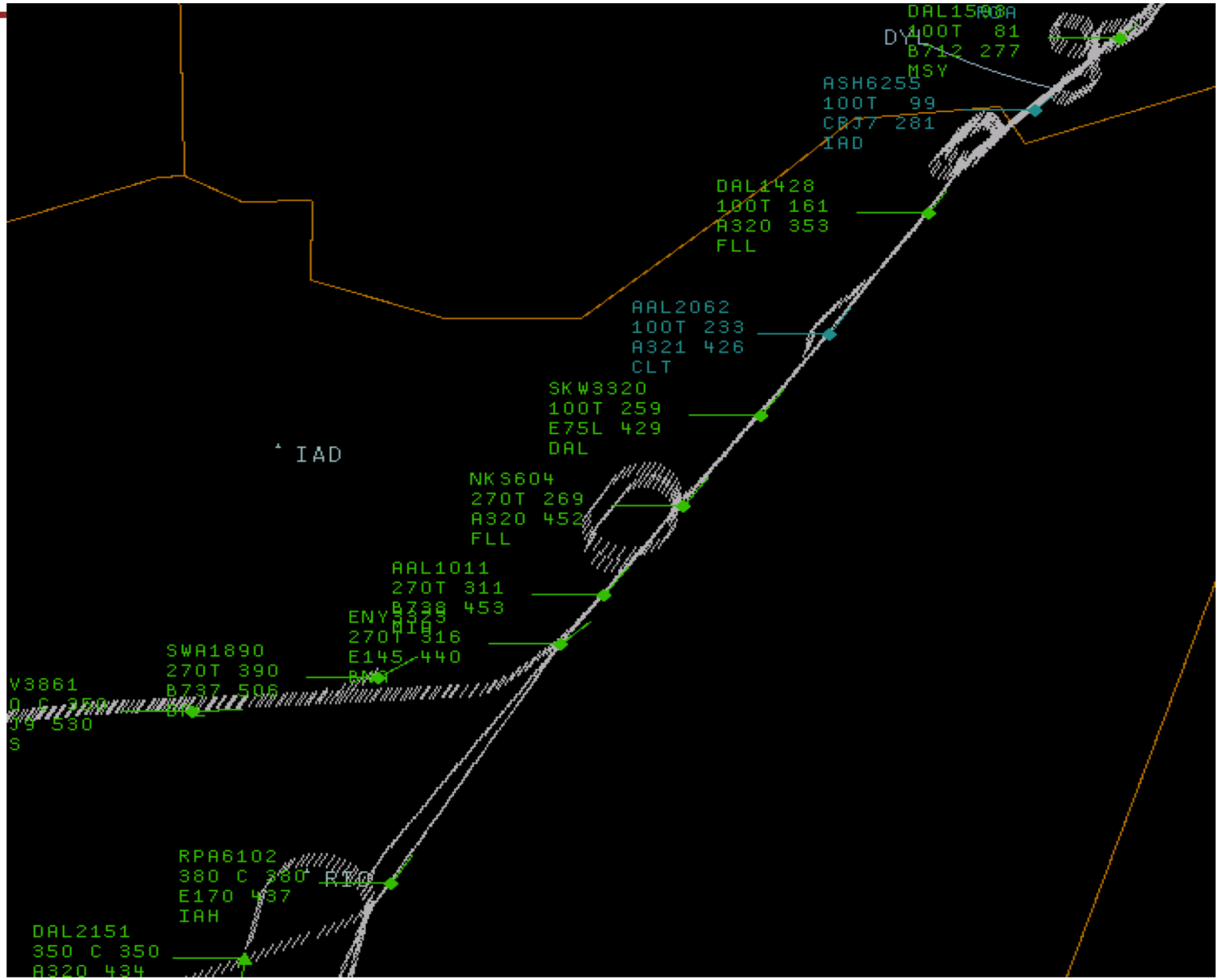
```
ZDC/CP    N90 HOLDING ZDC AT RBV FOR LGA DUE TO WX. Fwd by N90/TMU/RM
          - LNK: LGA
```


DAL1598
100T 99
B712 280
LGA
ASH6255
120T 121
CRJ7 266
LGA
DAL1428
100T 215
A320 390
LGA
IAD
AAL2062
270 C 270
A321 388
LGA
SKW3320
270T 279
E75L 442
LGA
NKS604
270T 350
A320 444
LGA
ENY3323
350 C 350
E145 517
LGA
SWA1890
390 C 390
LGA
370 C 370
B738 440
LGA
DAL2151
350 C 350
A320 317
LGA
CIBAC

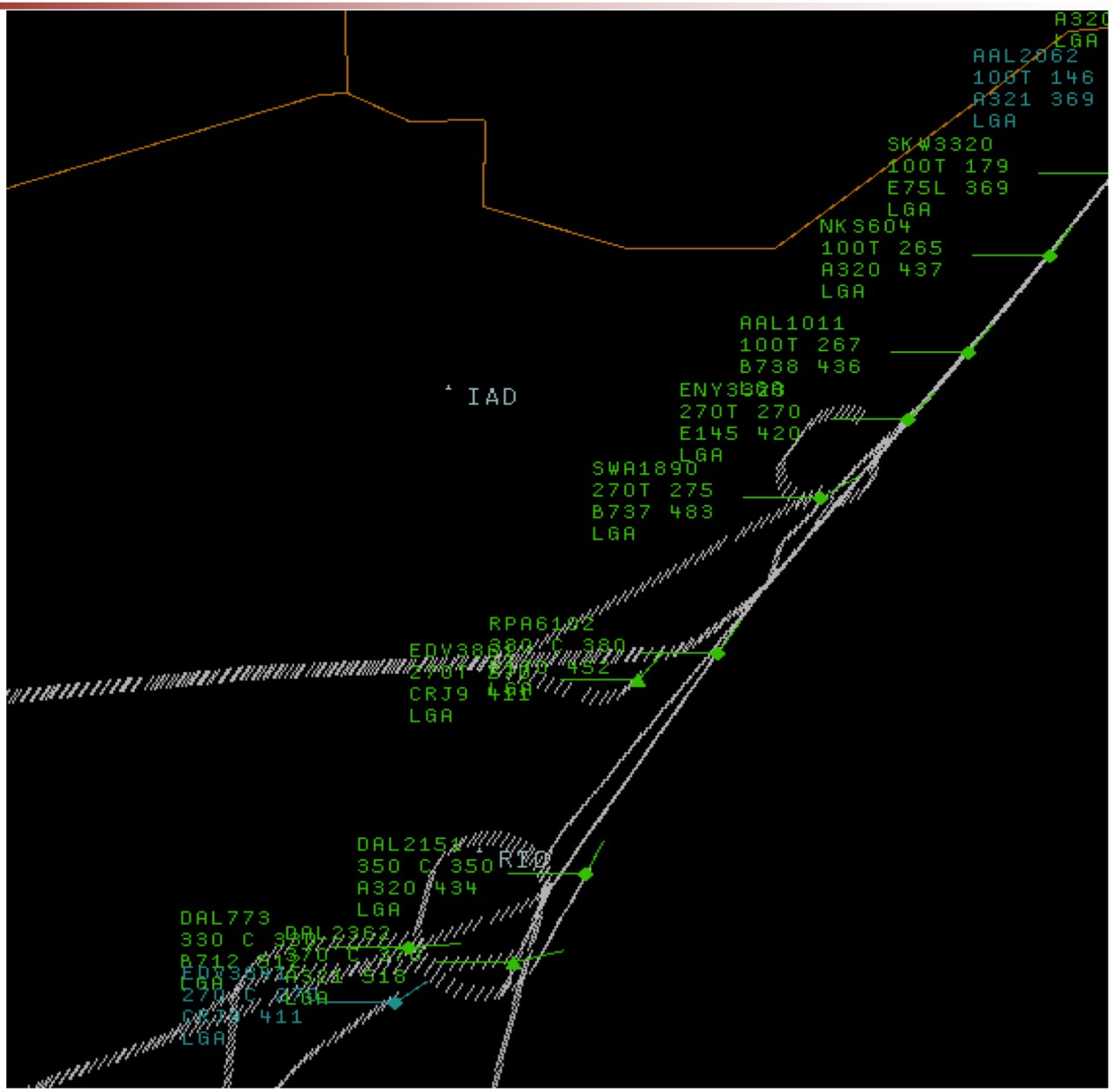
ZDC Internal Ground Stop to LGA

```
2044     ZDC/CP     STOP: ZDC to LGA
                    2044-2200, WX:Thunderstorms
                    ZDC:ZDC, STOP: - LNK: LGA - ESIS: CP
```

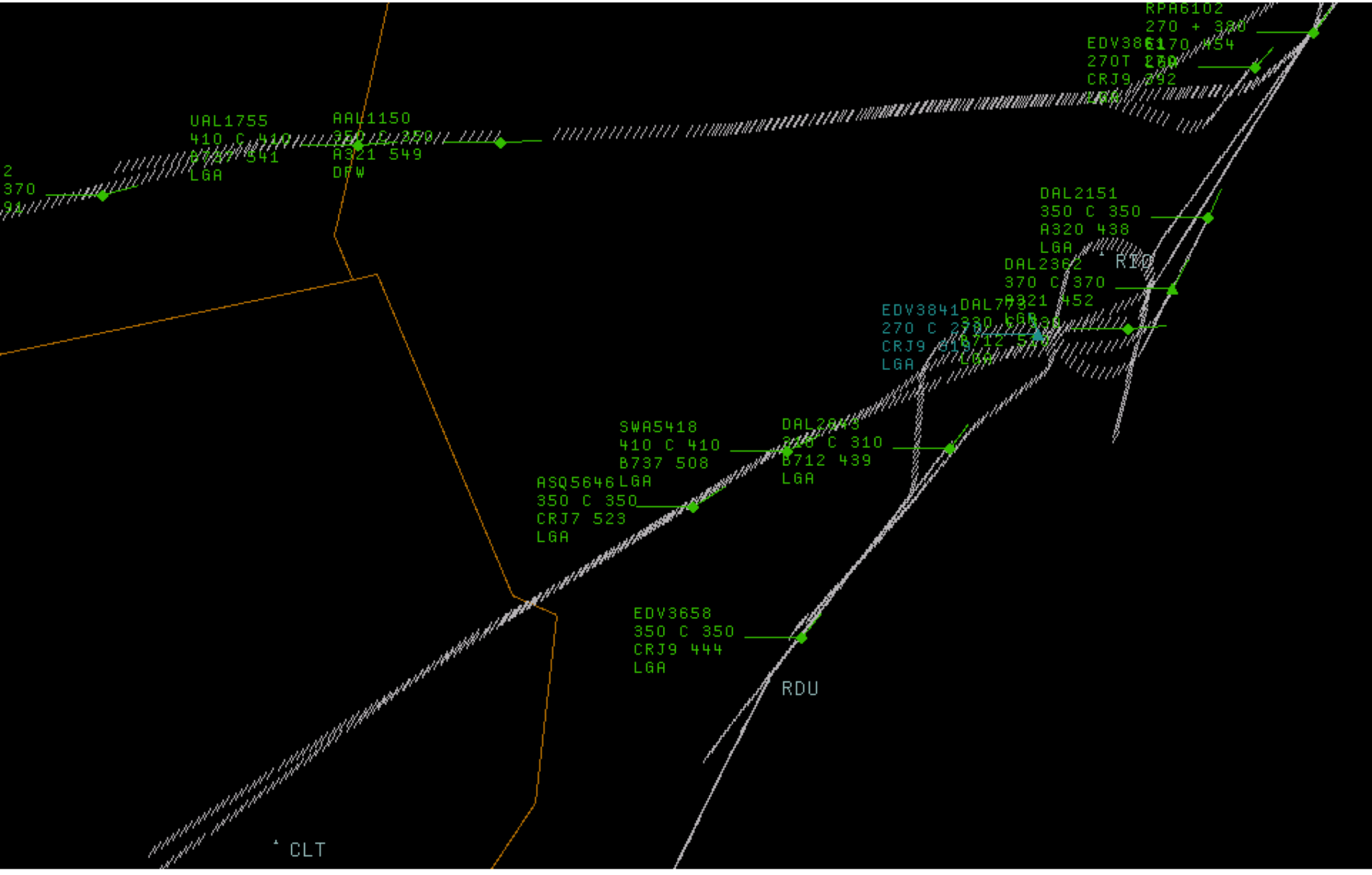
Holding For LGA



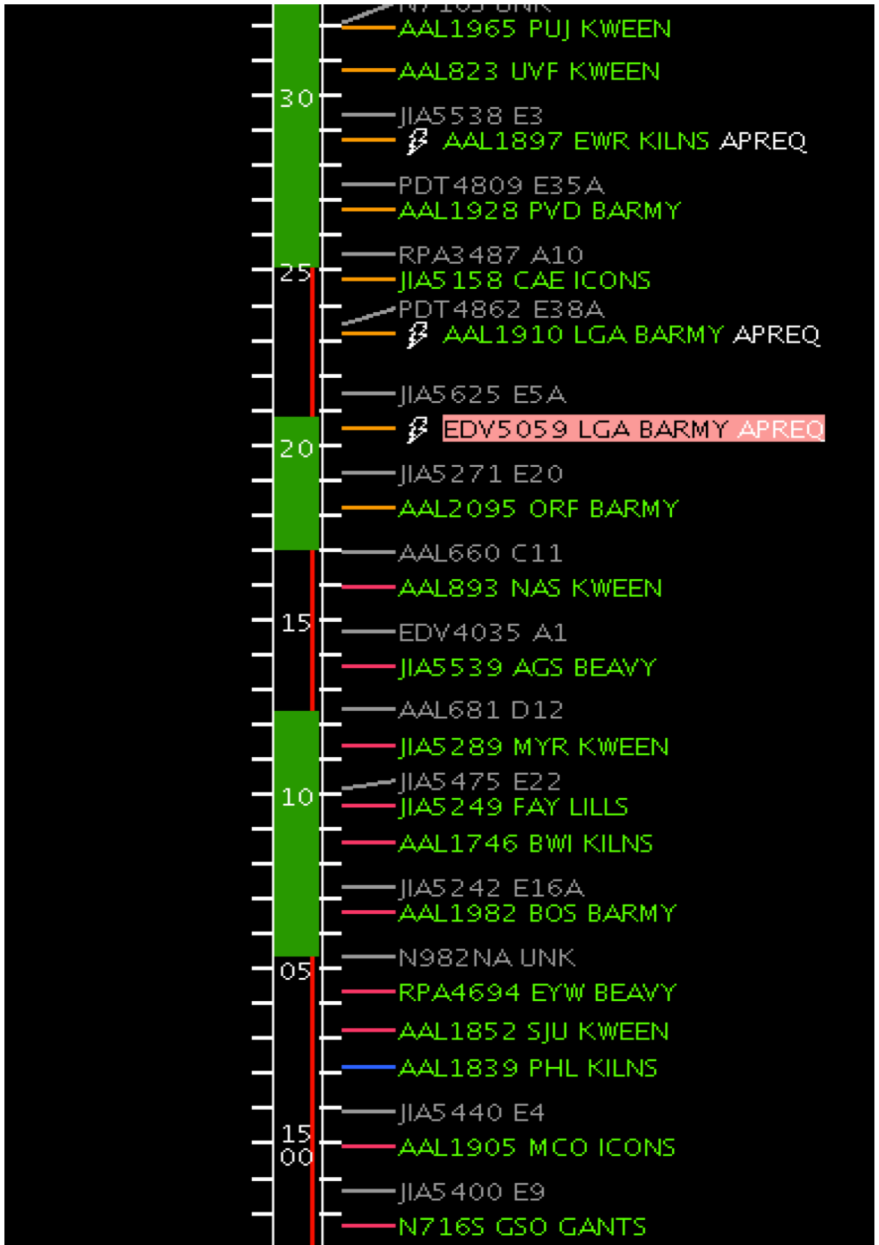
Out of Holding on N90 Boundary



Still Recovering South of Richmond



May Not Get Green Space

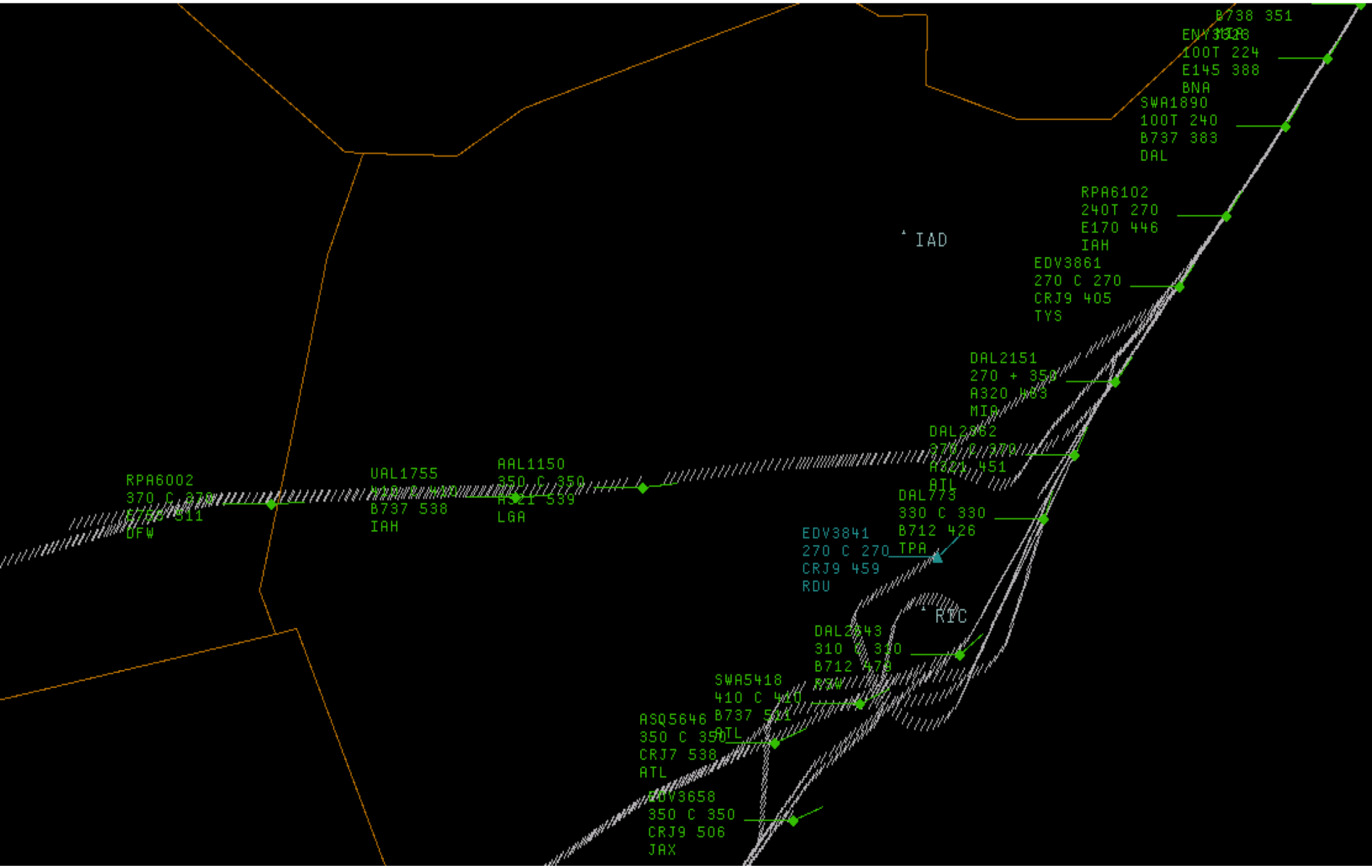


Ground Stop LGA Beyond ZDC

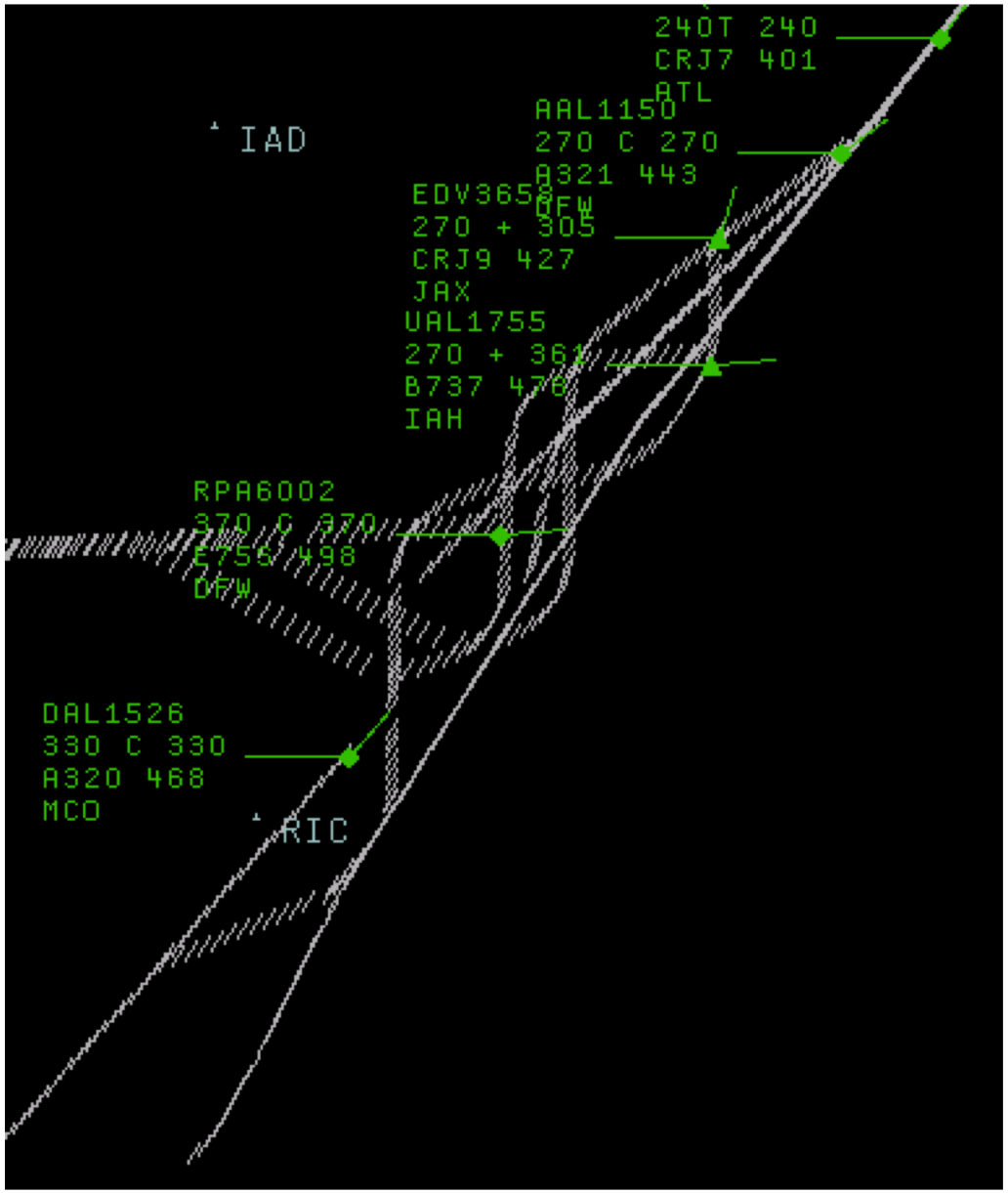
```
2130     ZDC/CP     STOP MODIFIED: LGA 30/2112Z-30/2230Z WEATHER / THUNDERSTORMS
                    FAC=(Manual), ZAU ZDC ZMP ZBW ZOB ZJX ZMA ZID ZTL ZNY TOT/MAX
                    /AVE DLY=1230,275,205.0 AAR=35/20/20/15/17/20/22/22/22
                    RMK:DAL AND THEIR SUBS ONLY DUE TO GATE/TAXI AND WEATHER
```

Ground Stop on STBO

Coming Out of Holding By Richmond



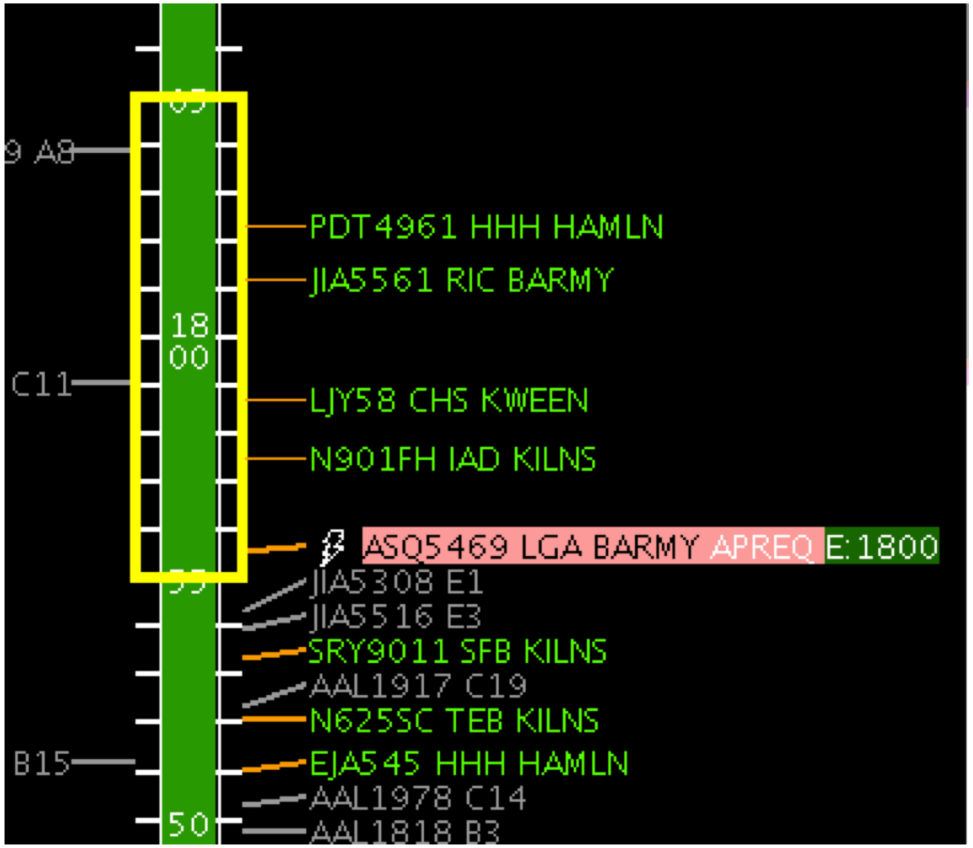
LGA Holding Ending



Command Center Sends out Ground Delay Program

```
ZDC/CP      GDP (UDP) LGA DISTANCE=1450 EXCPT NONE CYHZ CYOW CYUL CYYZ
            CYTZ CYQB
            EVENT=02/2119Z-03/0259Z, CUMULATIVE=02/2119Z-03/0259Z
            WEATHER / THUNDERSTORMS MAX=91 AVG=31.0 AAR=36 PR=36 PF=0
            RMK: ZTL GROUNDSTOP CANCELLED. AIRCRAFT RELEASED ON EDCTS.
            ARR 04 DEP 13. ADVZY=133 LGA/ZNY 08/02/2016 - LNK: LGA -
            ESIS:
            CP,Bay1,Bay2,Bay3,Bay4,Bay5,Bay6,Bay7,Bay8,ESP1,ESP2,STMC,SW
            MP,MAC,ADS
```

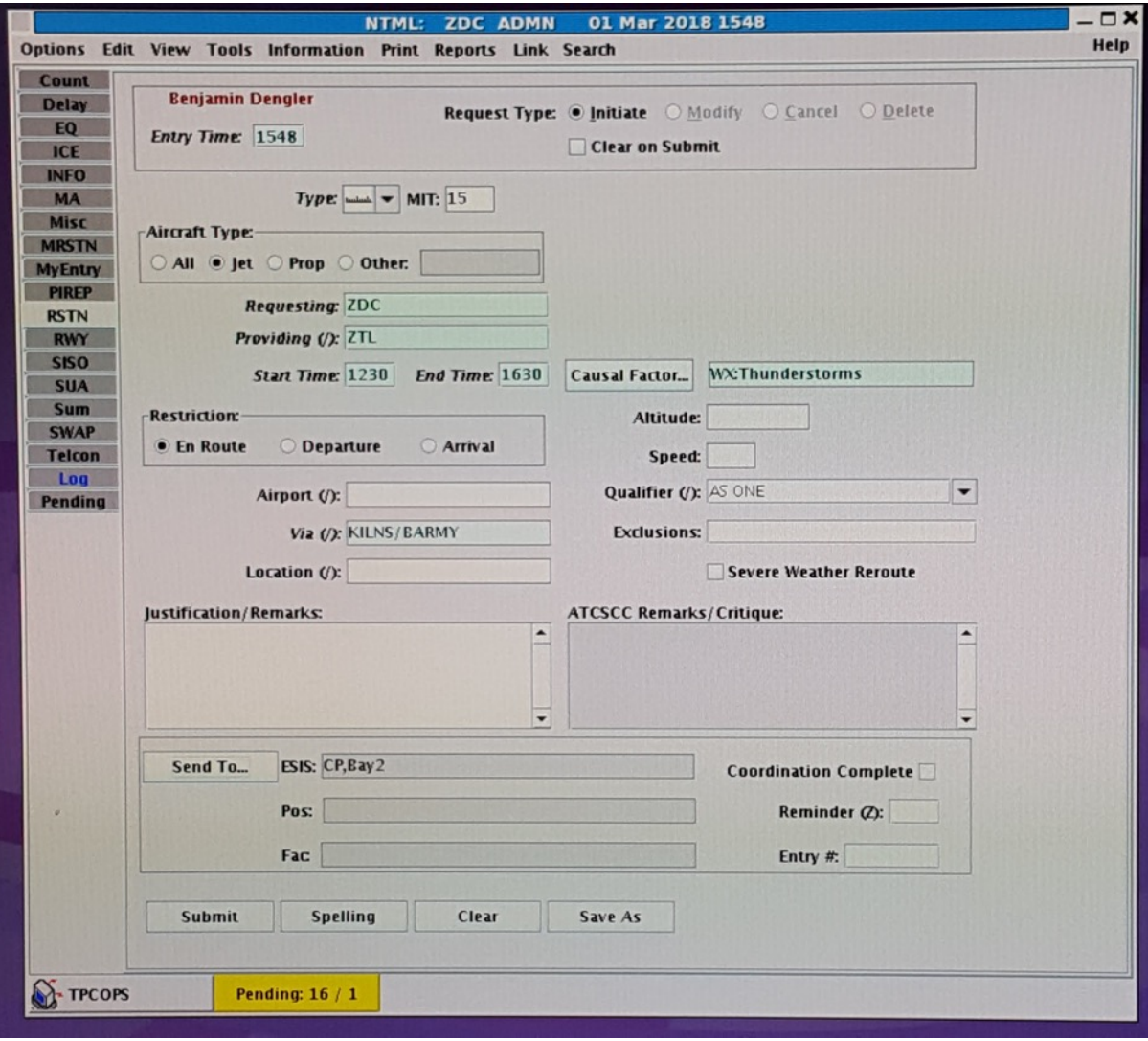
Ground Delay Program on STBO



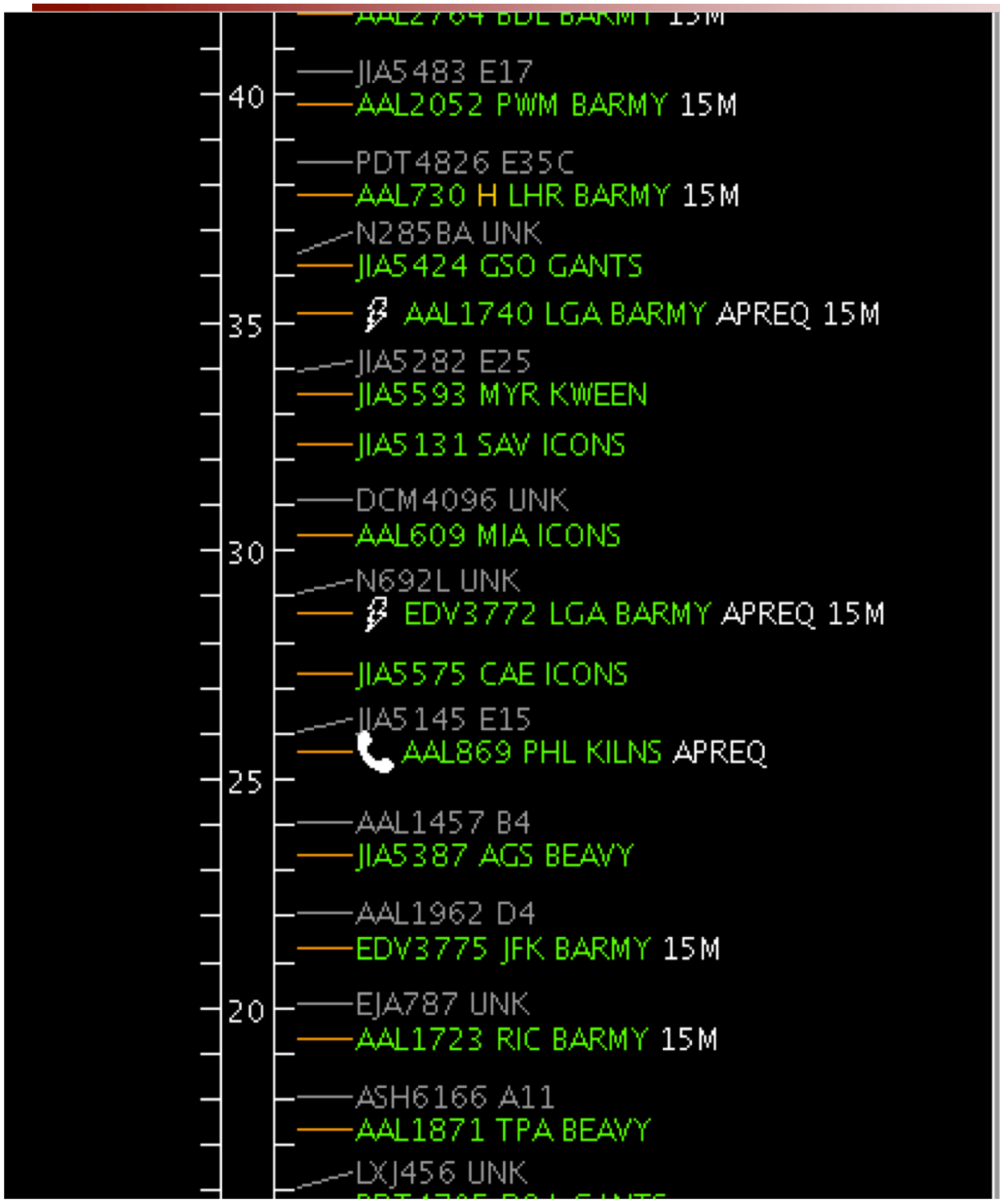
KILNS GS and BARMY MIT

1753	ZDC/CP	STOP: ZTL via KILNS JETS 1749-2200, WX:Thunderstorms ZDC:ZTL, STOP: APVD 1752/DCC:NE/VI - ESIS: CP,Bay2
1753	ZDC/CP	EnRte via BARMY 15 Mit JETS Excluding: NUTZE AOB FL230/ APREQS 1750-2200, WX:Thunderstorms ZDC:ZTL, RSTN: APVD 1752/DCC:NE/VI - ESIS: CP,Bay2

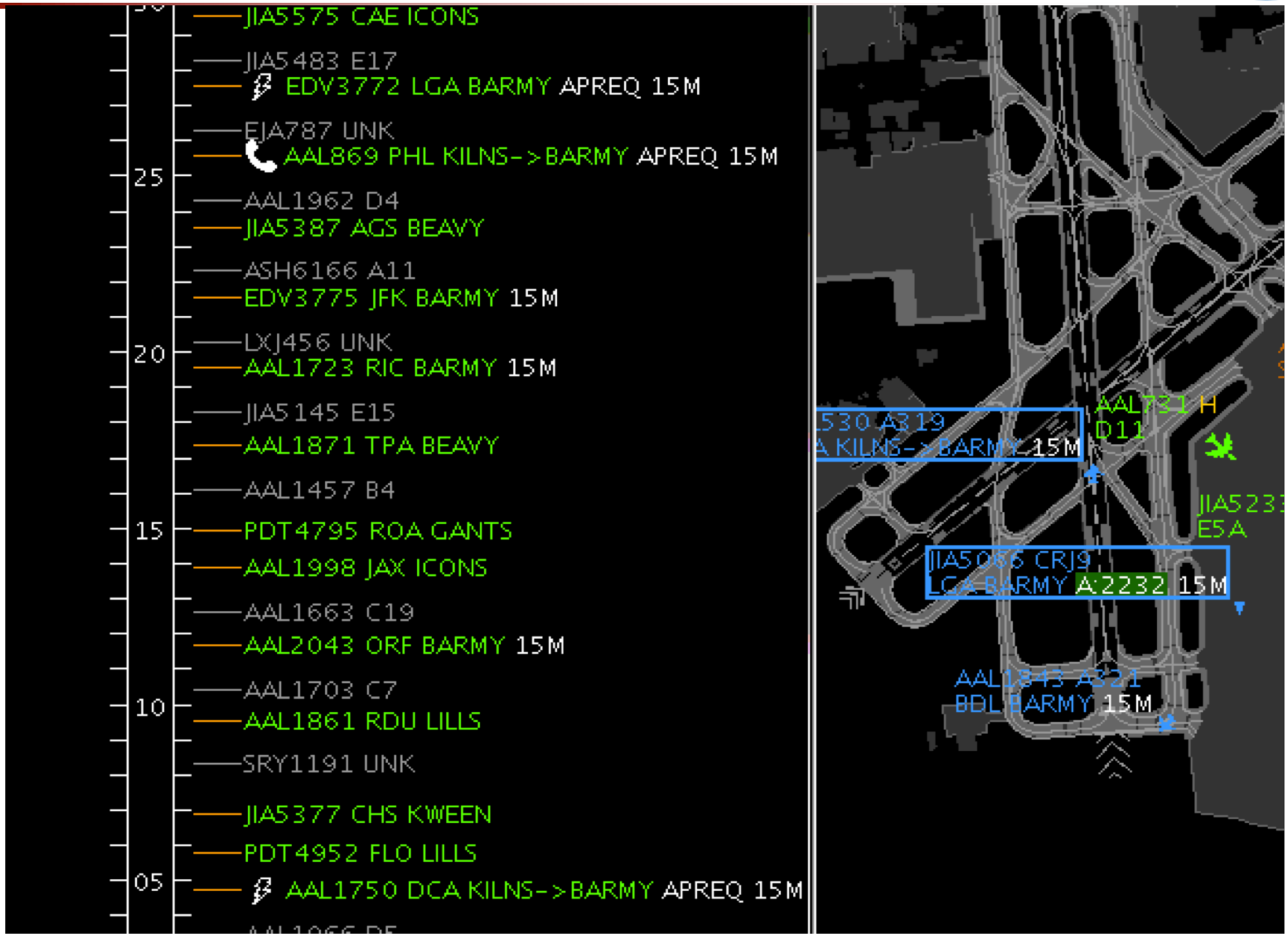
NTML ZDC MIT Restriction Over KILNS/BARMY



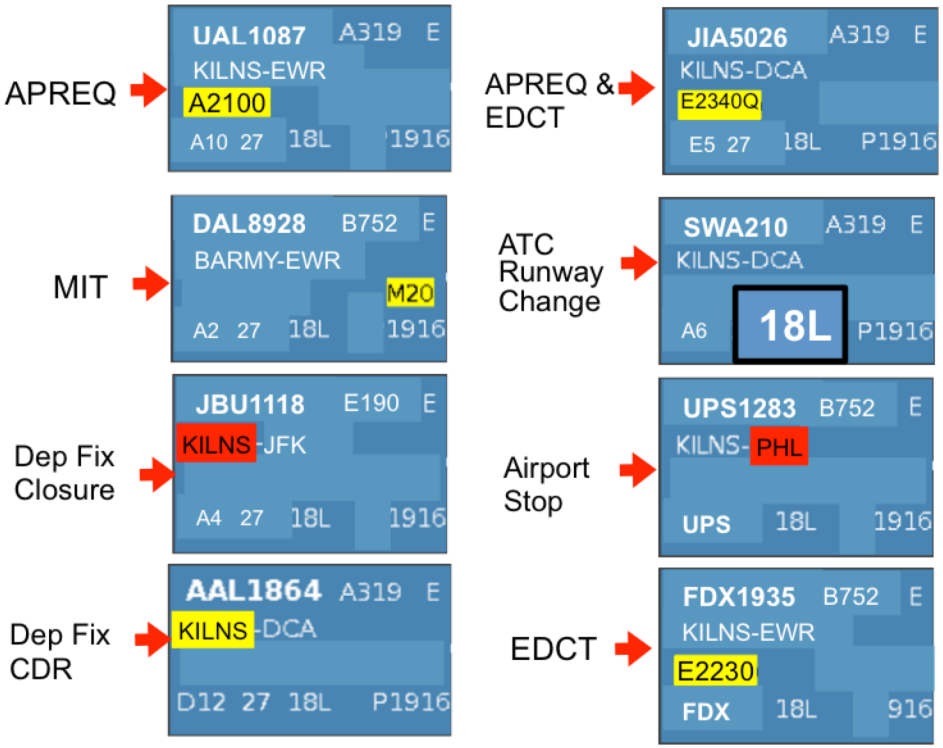
BARMY MIT ON STBO



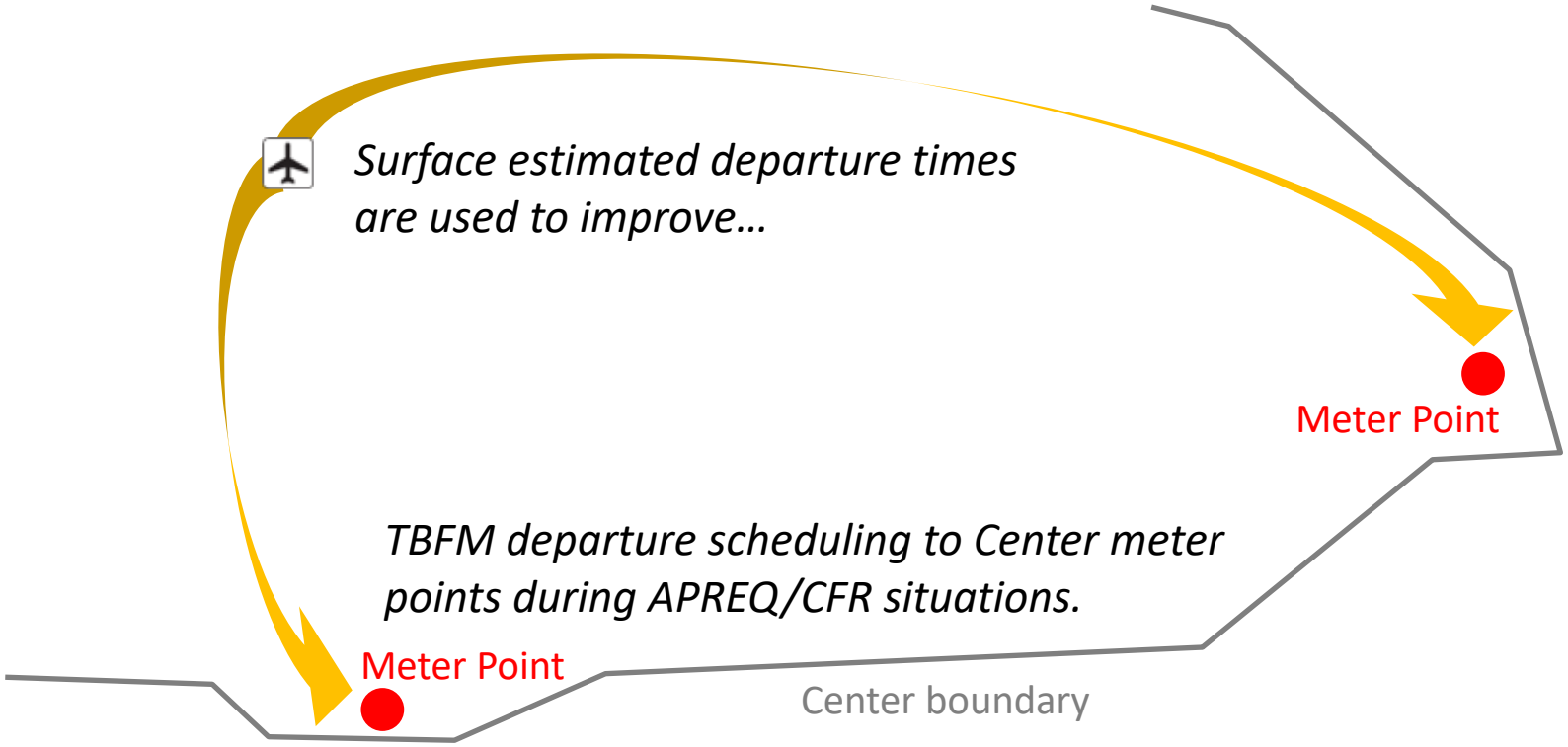
KILNS Swapping to BARMY



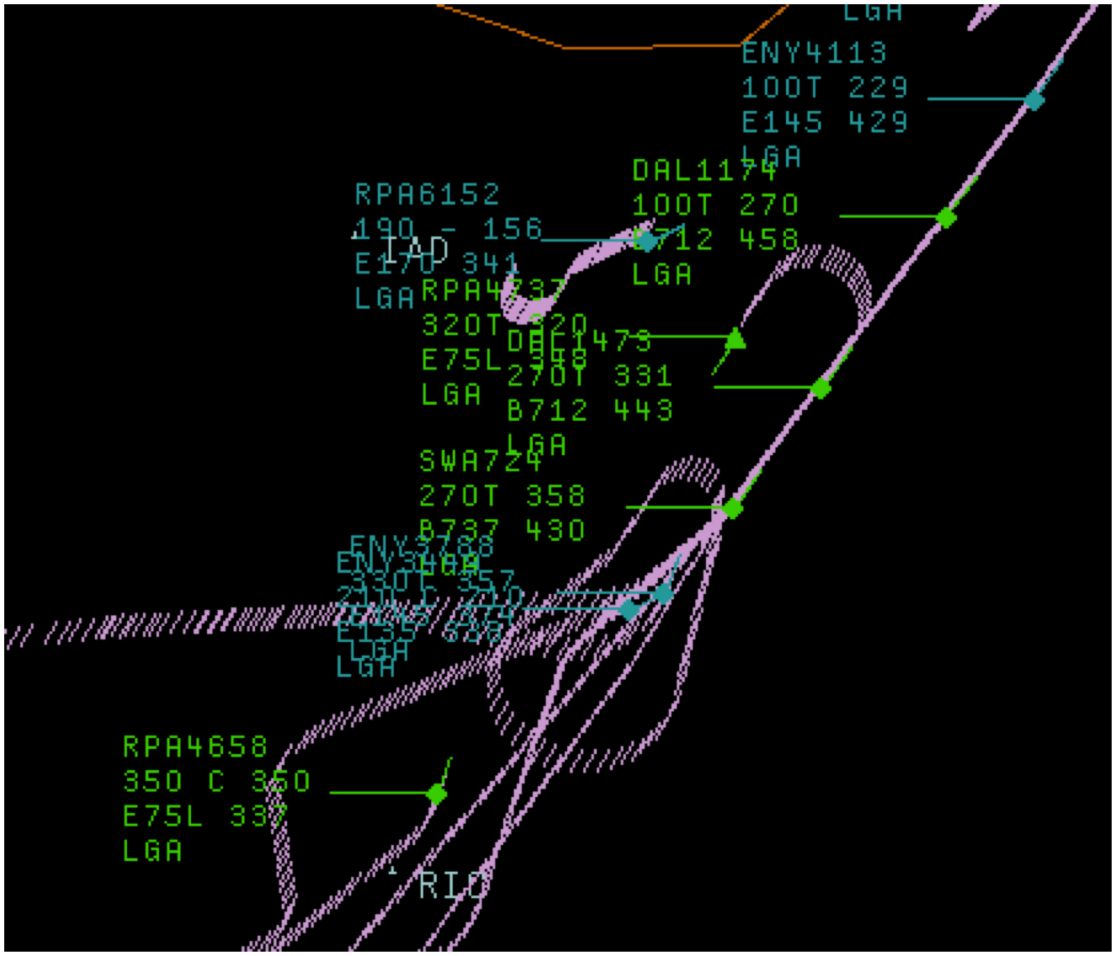
Ramp Data Tags



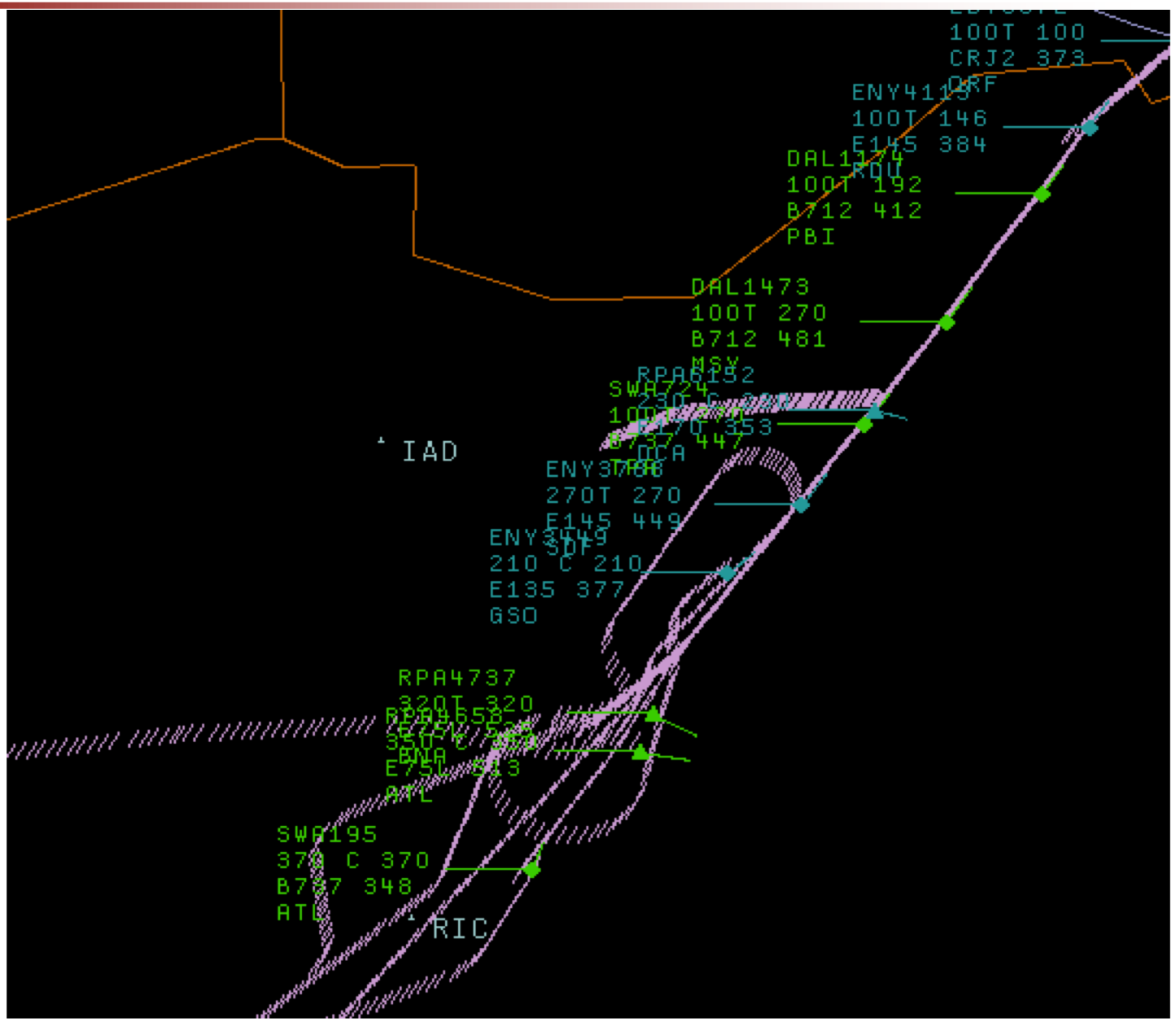
ATD-2 and Stream Insertion



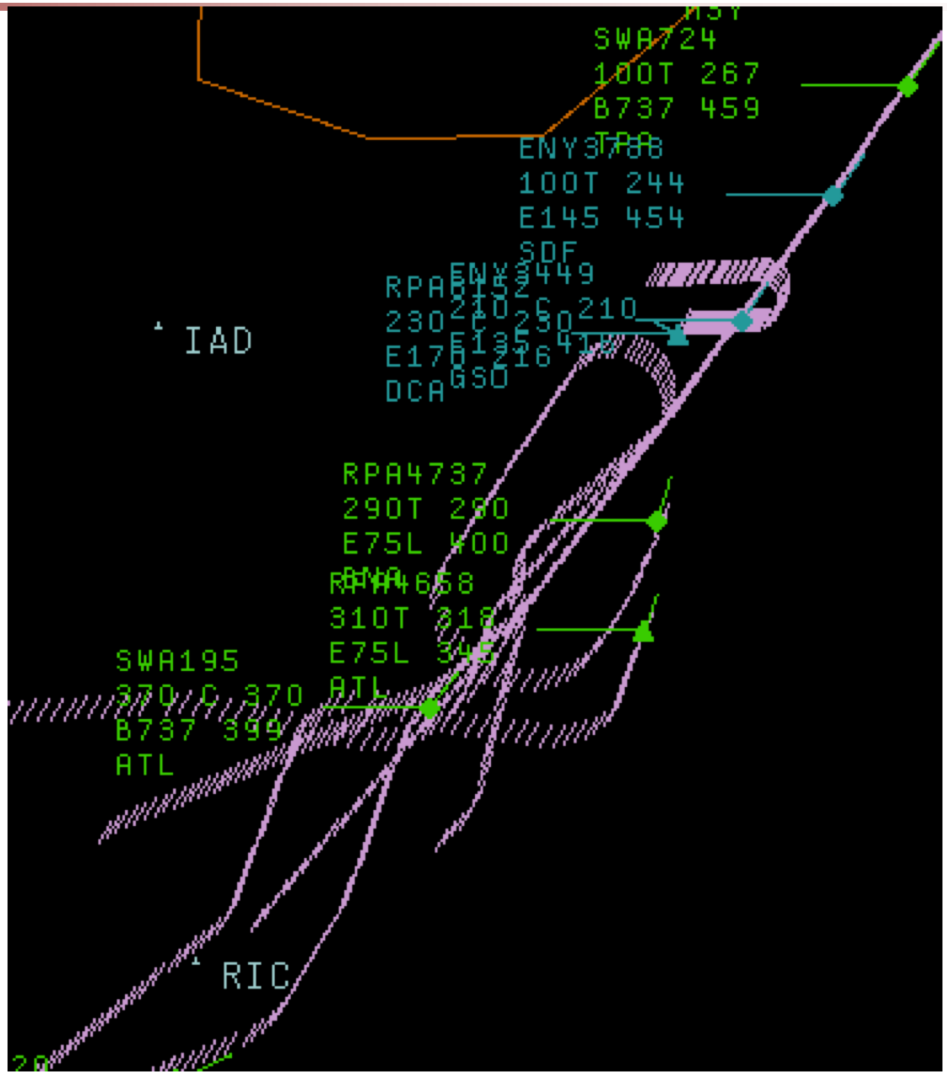
ATD-2 and Stream Insertion



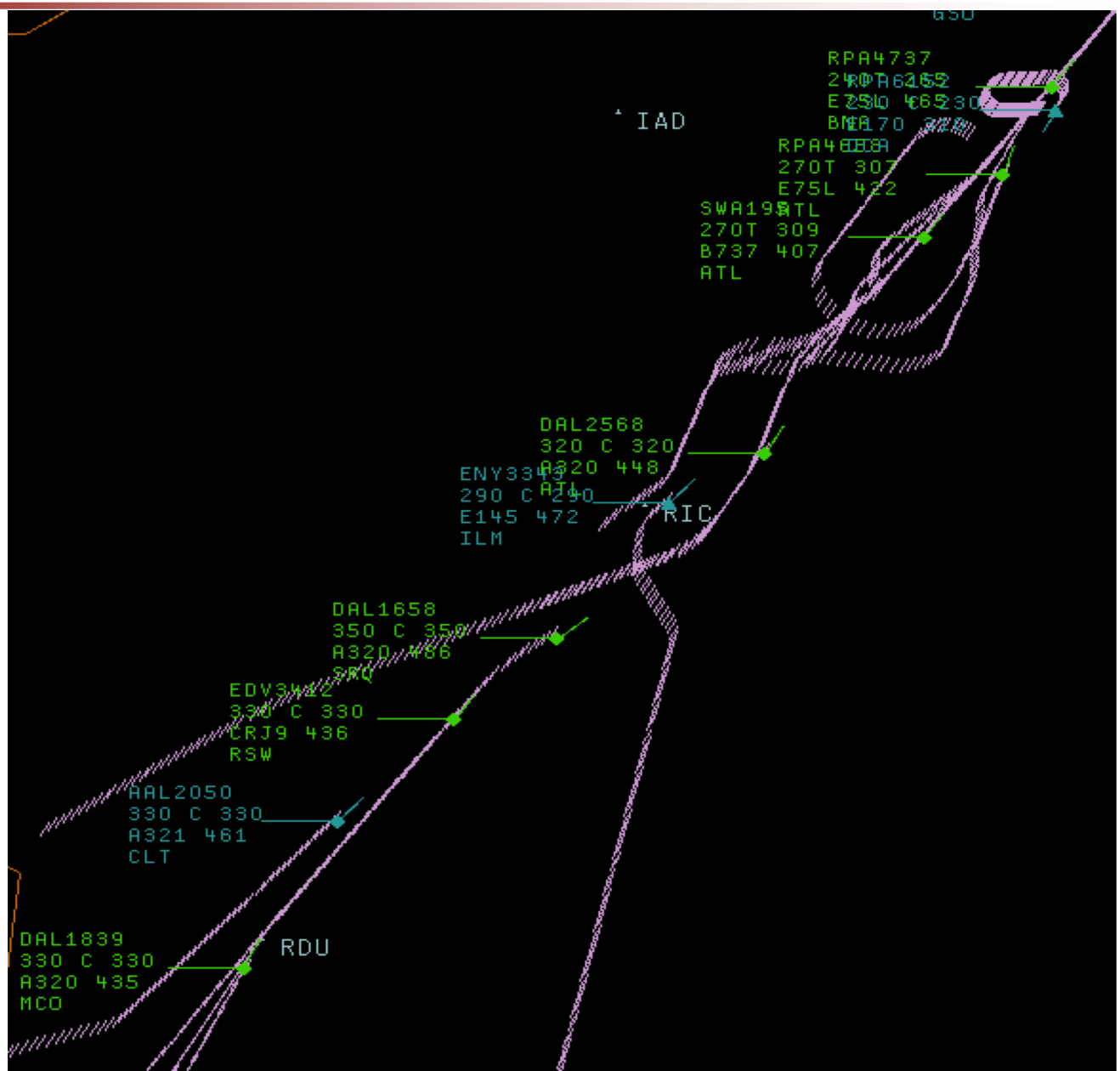
Non-Compliant APREQs



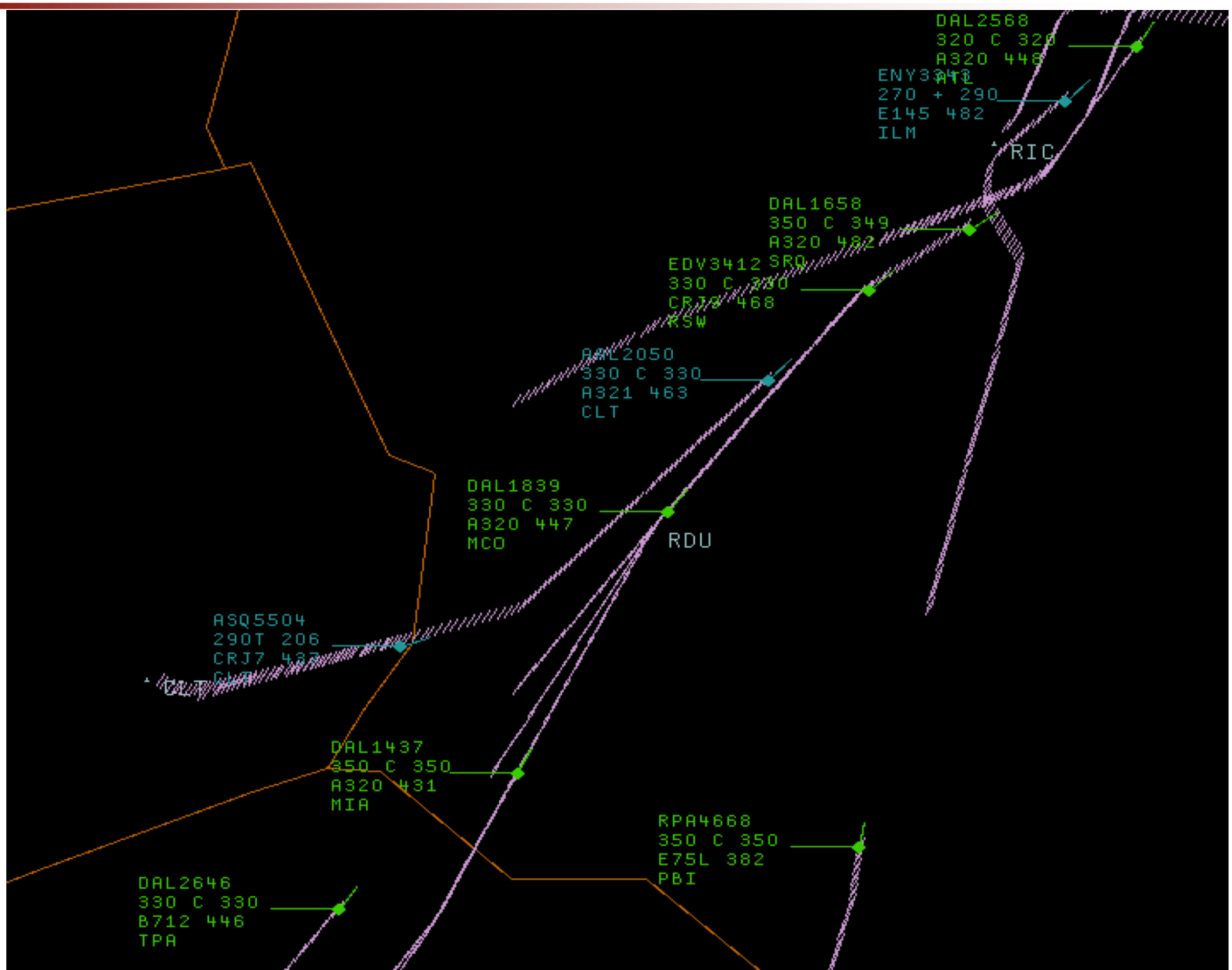
Non-Compliant Departures and Excessive Vectoring



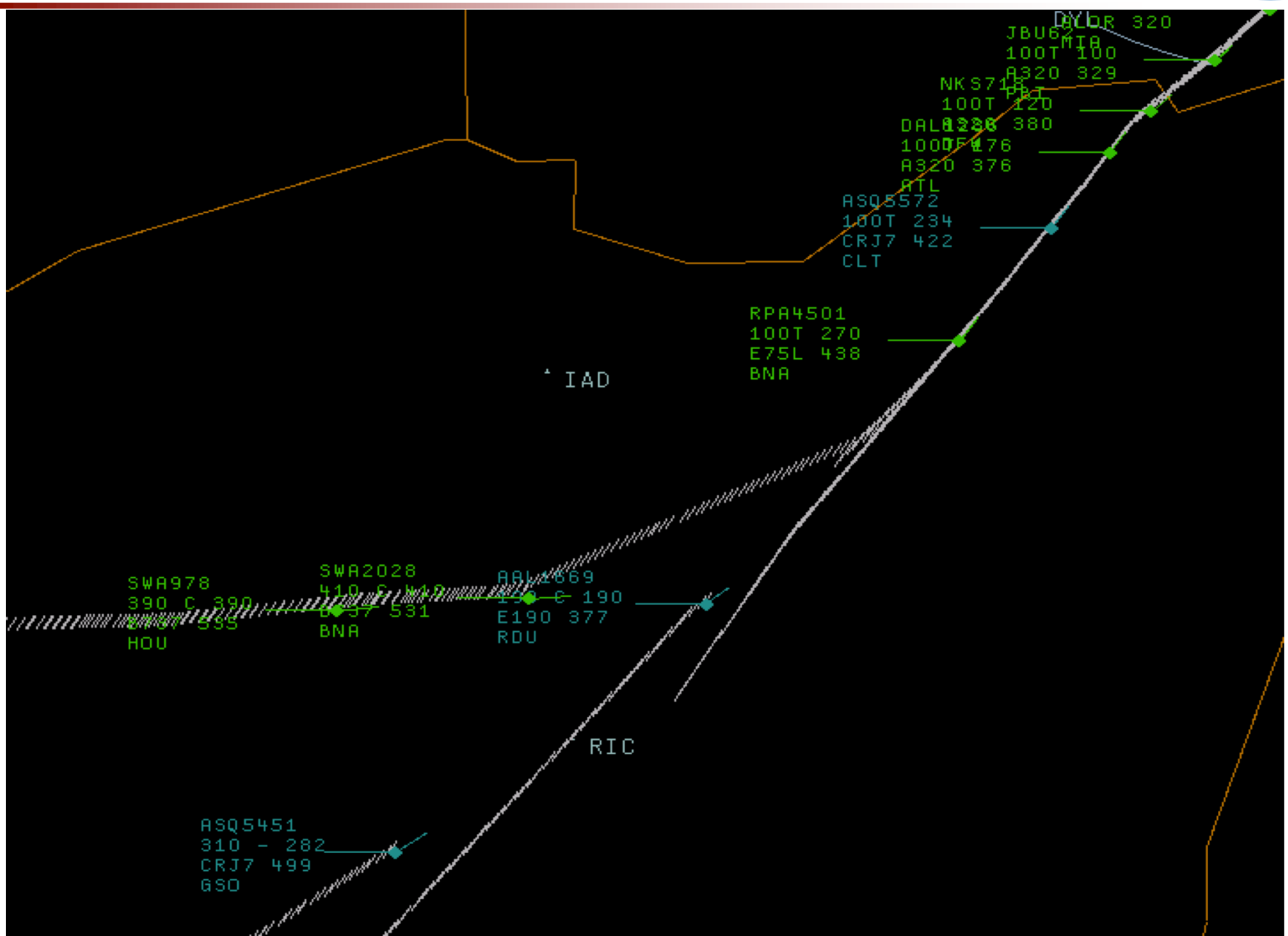
Consequences of Bad Releases RDU departure delayed 46 minutes



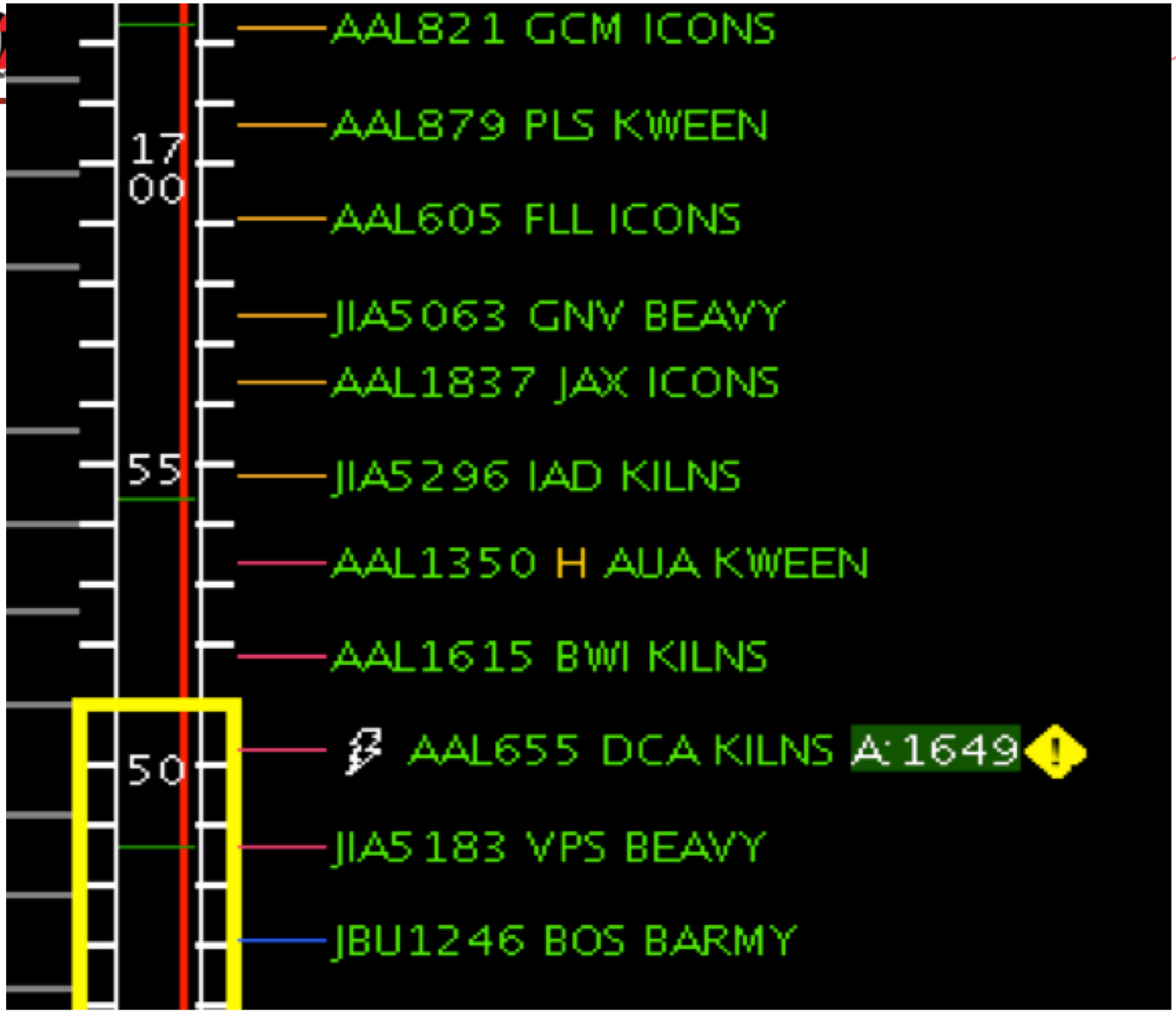
Came Out of Hold Before Next Flow Arrived



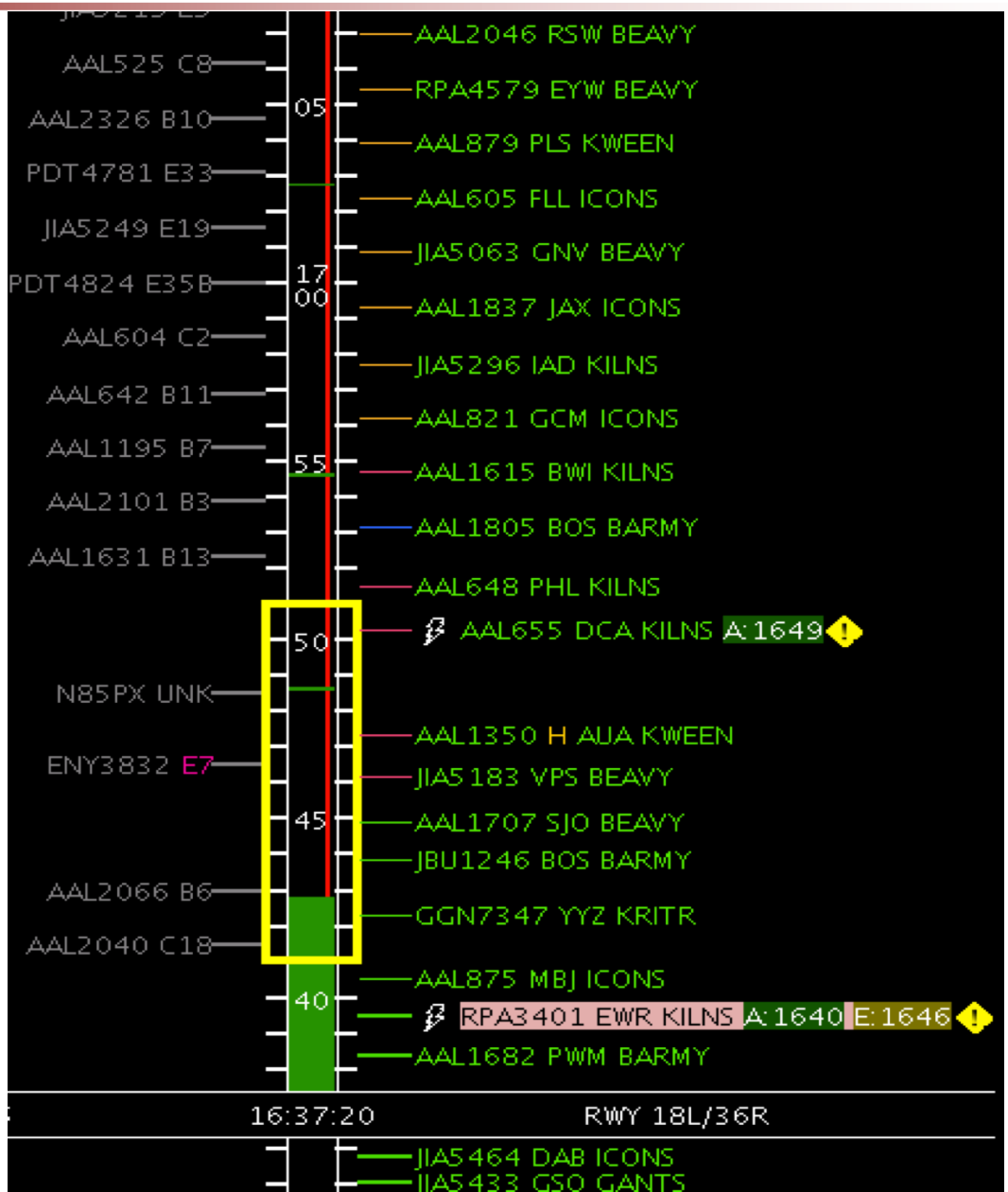
Compliant APREQs



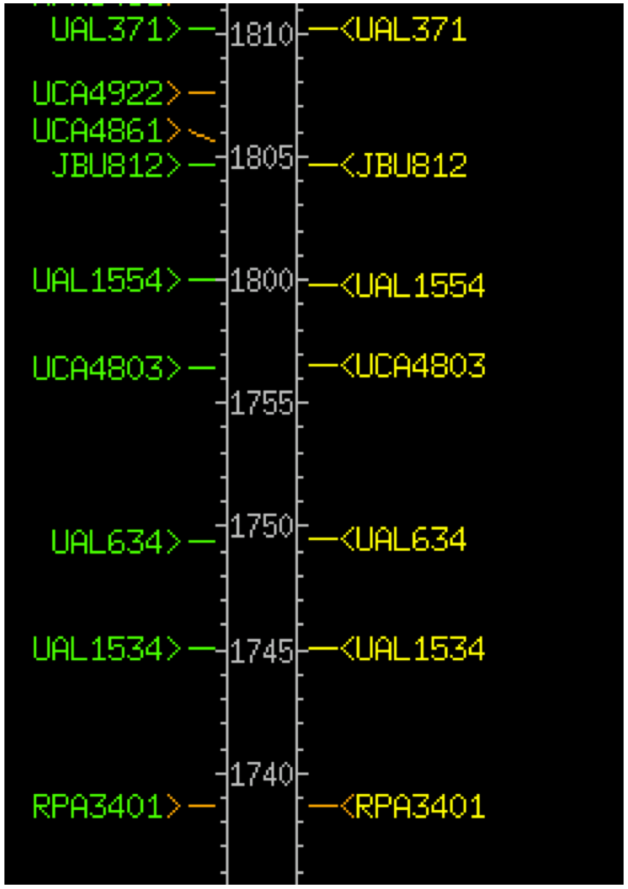
APREQ/EDCT Window/Slivers of Green


AAL821 GCM ICONS
AAL879 PLS KWEEN
17
00
AAL605 FLL ICONS
JIA5063 GNV BEAVY
AAL1837 JAX ICONS
55
JIA5296 IAD KILNS
AAL1350 H AUA KWEEN
AAL1615 BWI KILNS
AAL655 DCA KILNS A:1649
50
JIA5183 VPS BEAVY
JBU1246 BOS BARMY

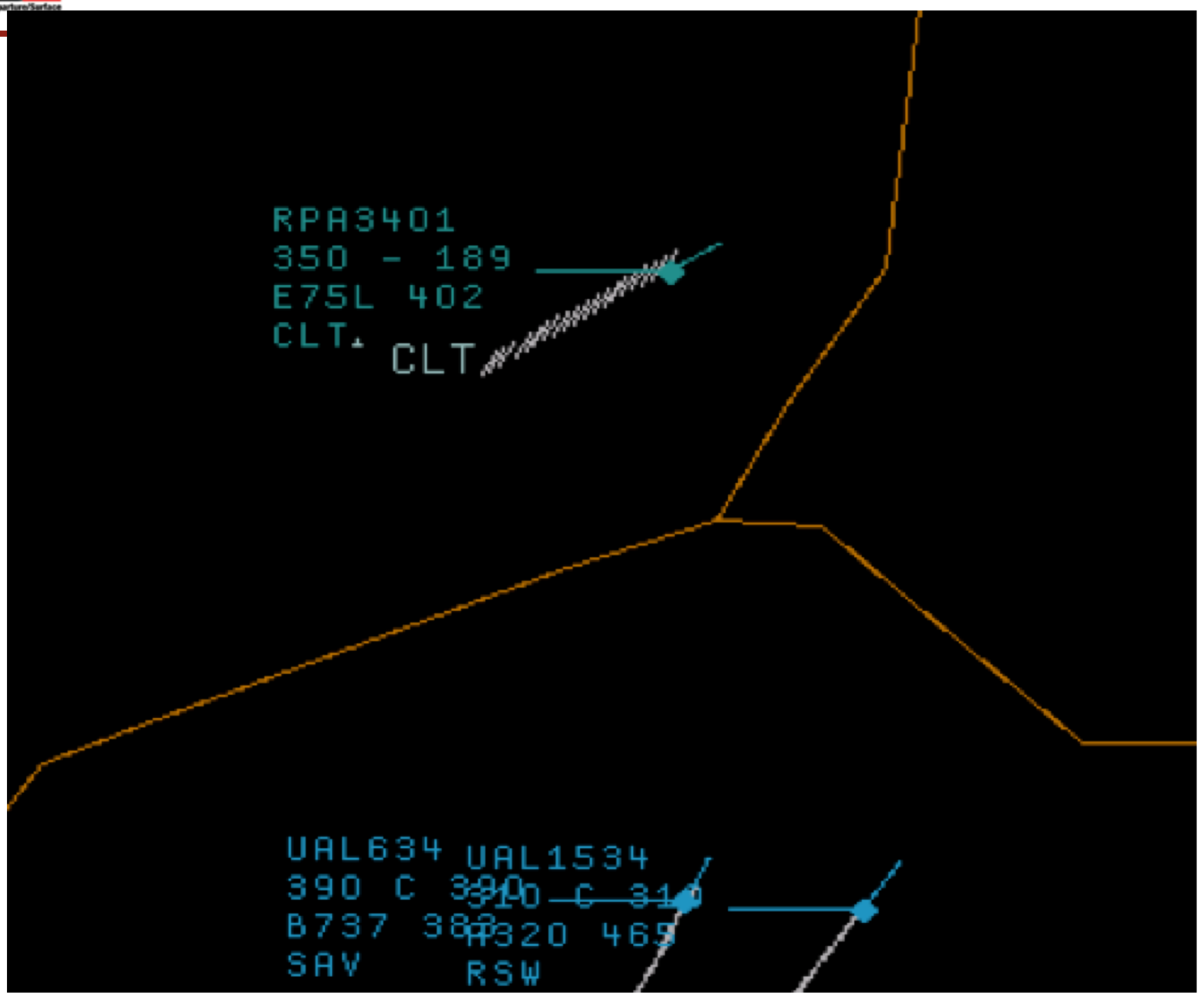
On Time Departure



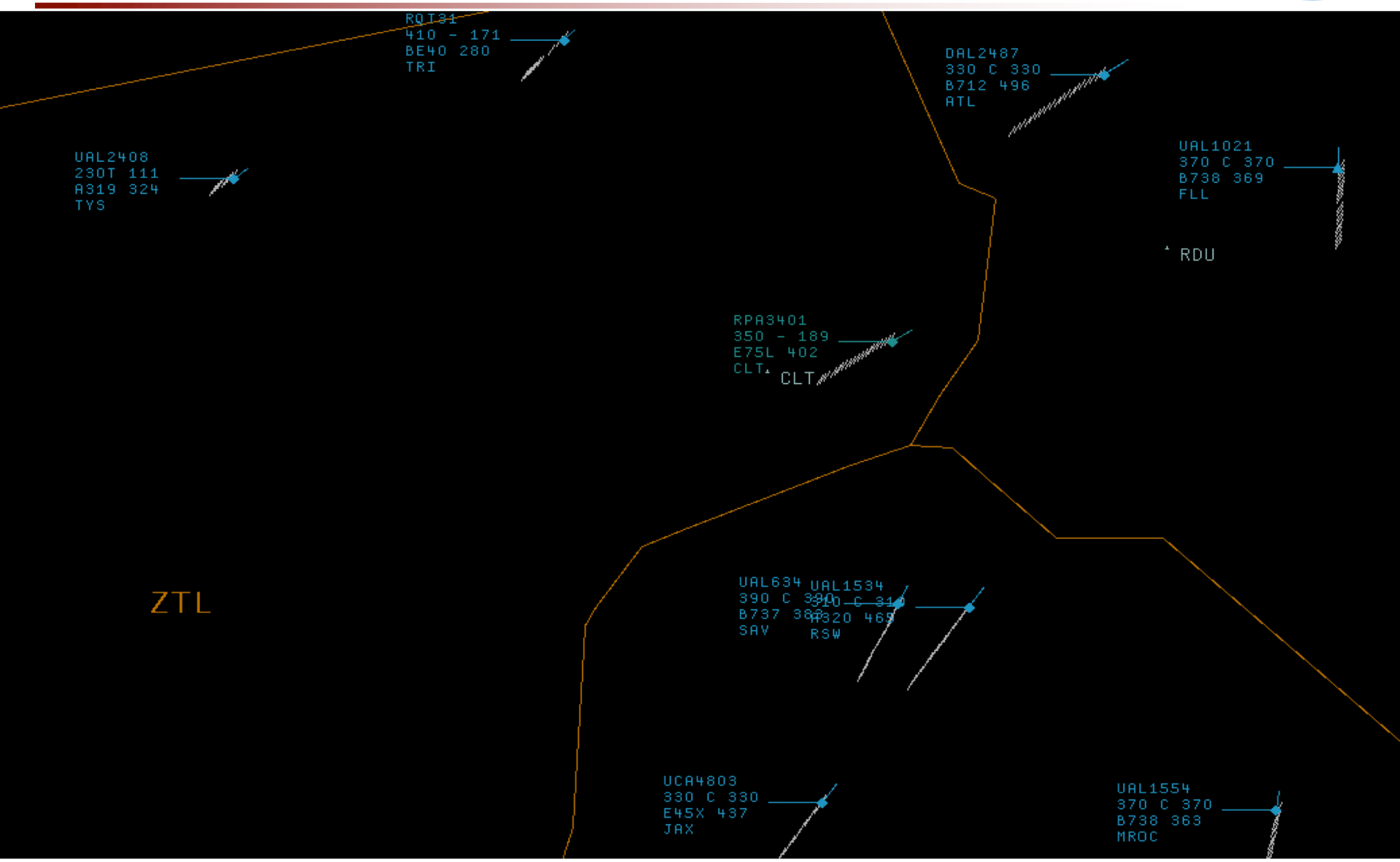
RPA3401 TGUI View



Understand and Process ATC Restrictions in the NAS



RPA3401 Departing CLT



Aircraft Early to Runway

Highlight Shows only Red Space

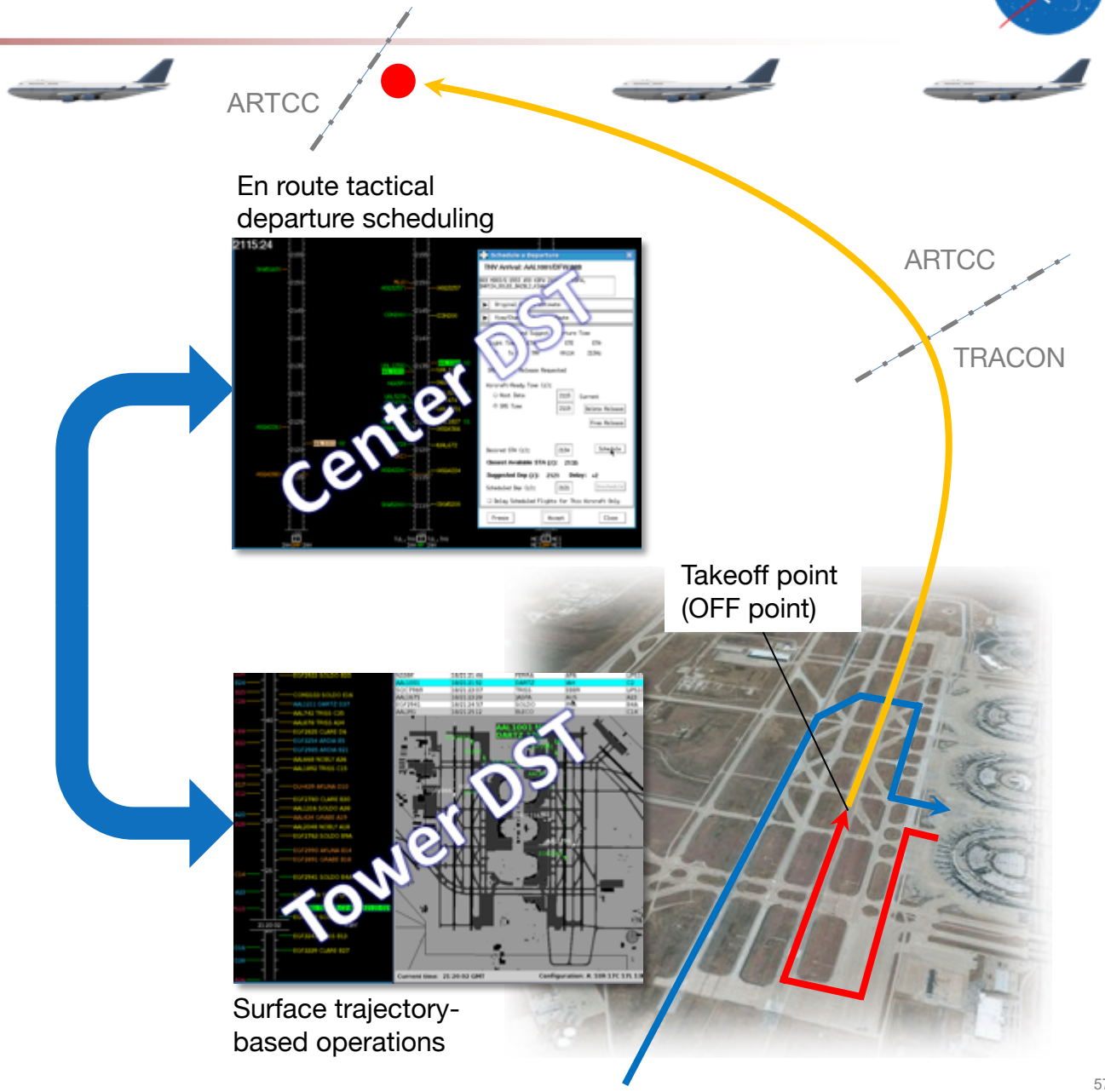
Backup

- Backup

Tactical Departure Scheduling – Prior Research

En route system uses information from surface system for more precise tactical departure scheduling.

Surface system predicts OFF times and runway assignments for use by the en route scheduling system.

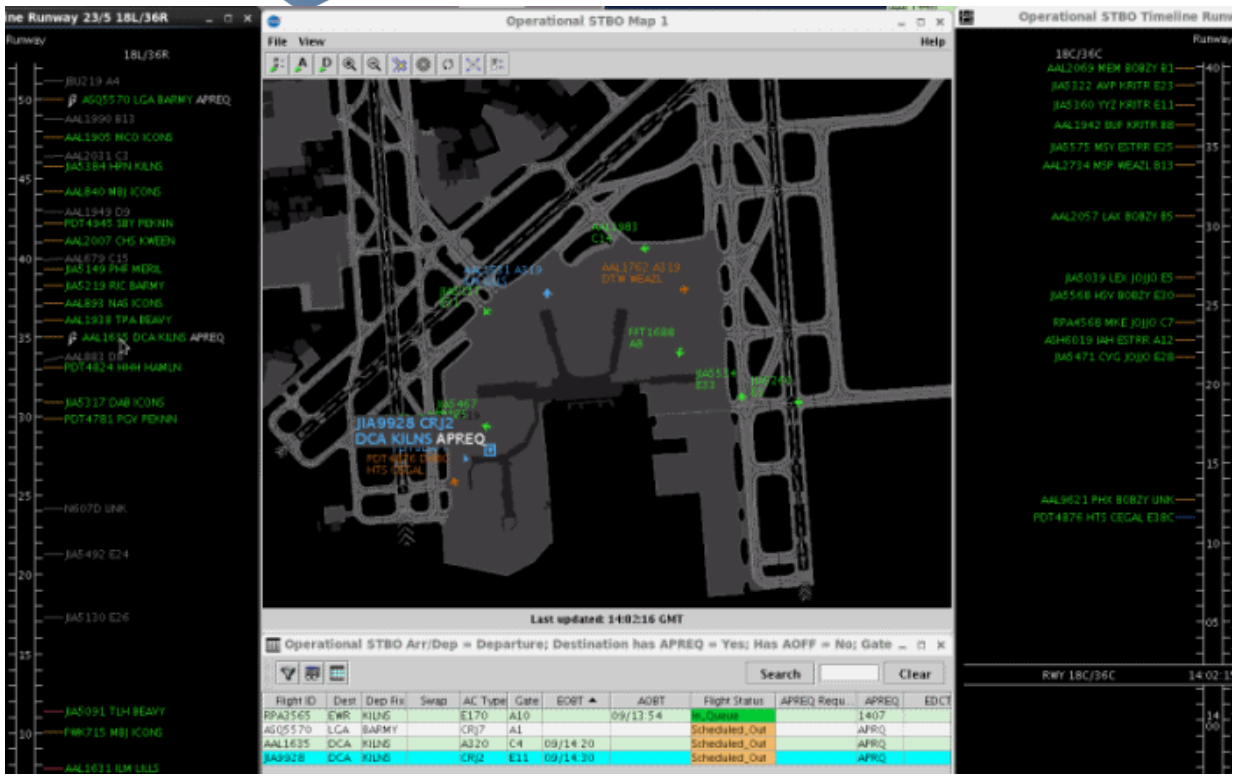


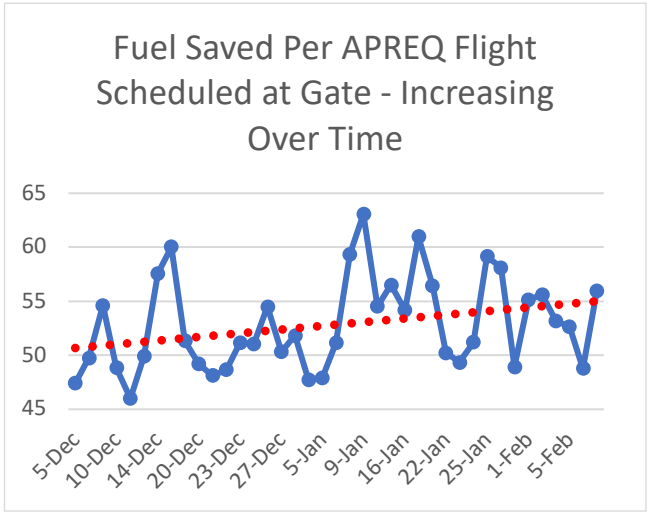
Brian Briefs on How data is and will be scraped into STBO

Overhead Stream Operational Integration Benefits Preview

22.5 hours of delay saved by electronically renegotiating a better overhead stream time for over 172 flights. Trending upward.

42,824 lbs. of fuel saved by scheduling APREQs at gate. Trending upward.



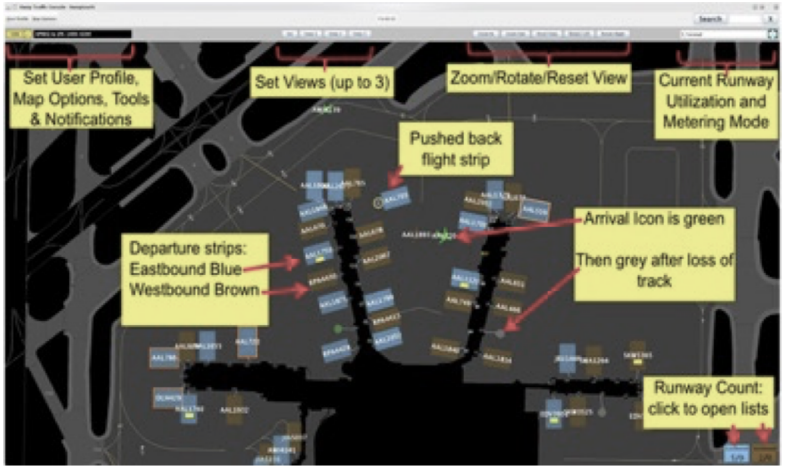


- The benefits described here are associated with better use of existing capacity in the overhead stream, and technology to reduce surface delay.
- These benefits are in addition to (distinct from) surface metering savings.

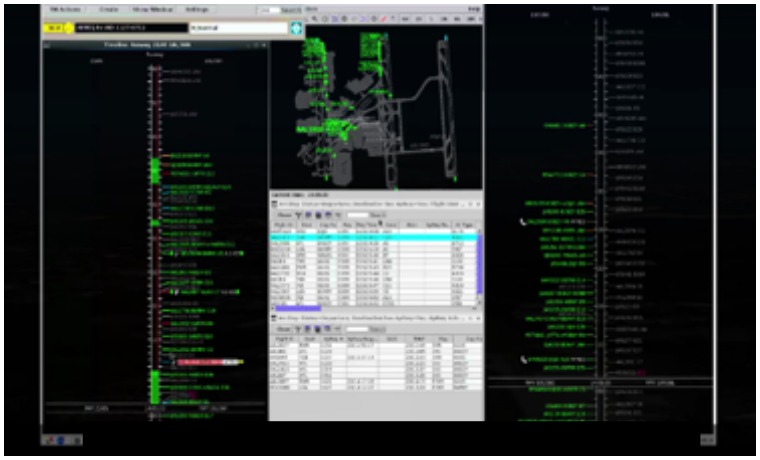
What is Airspace Technology Demonstration 2 (ATD-2)?

ATD-2 is a ***field demonstration*** that evaluates the benefits of ***wholistic consideration*** of arrival, departure and surface (***IADS***) traffic flows while introducing new technologies and procedures into its ***collaborative operational environment***

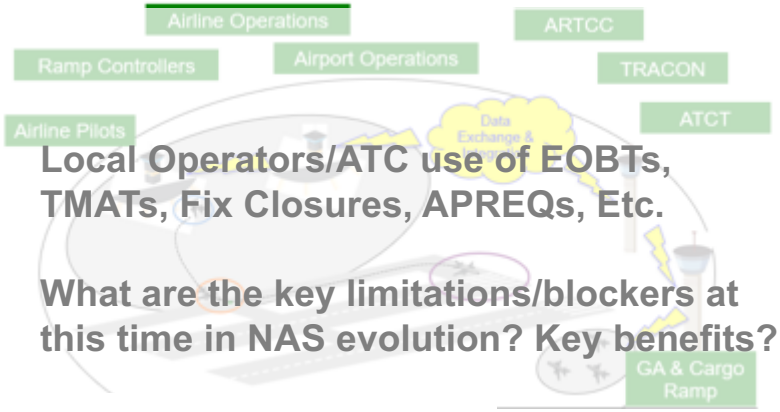
Collaborative Surface Metering w/Ramp Tool



Overhead Stream Operational Integration

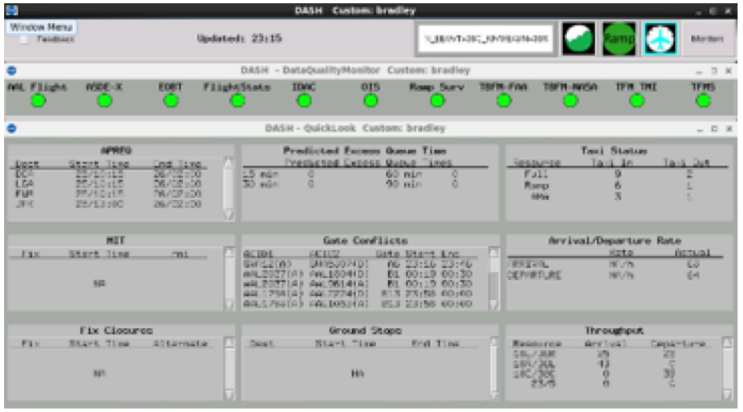


ATC/Operator Data Exchange and Integration

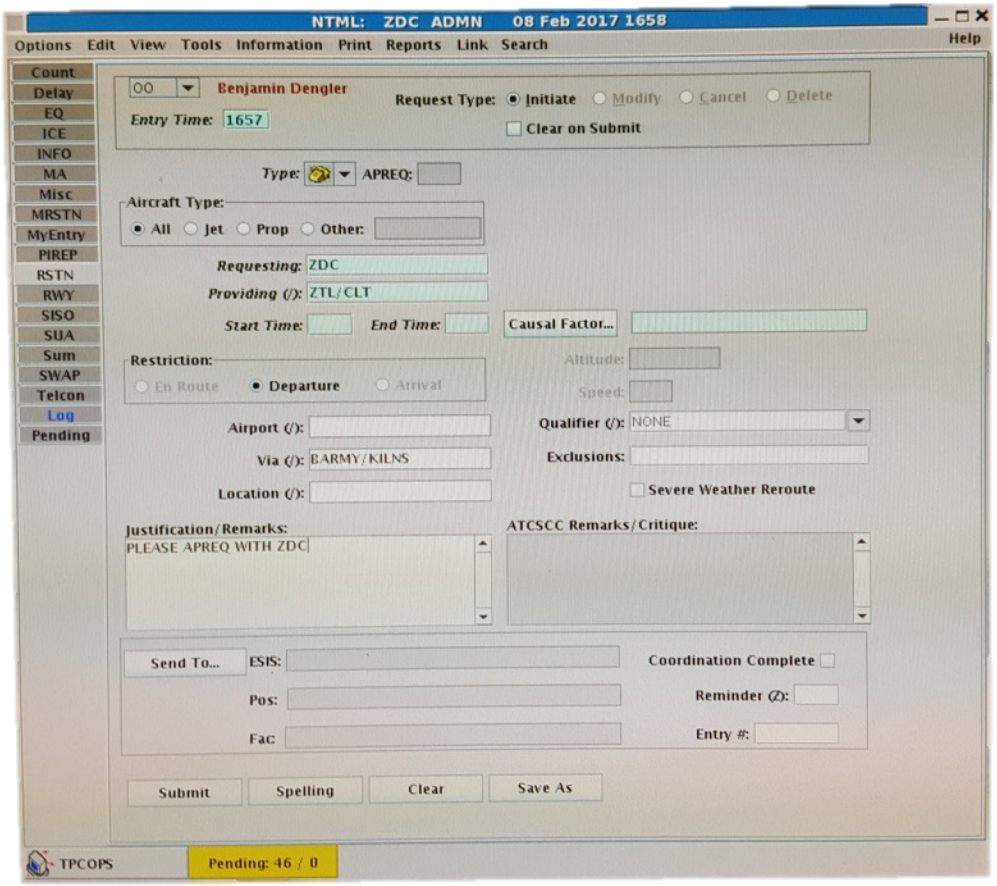


- **Local Operators/ATC use of EOBTs, TMATs, Fix Closures, APREQs, Etc.**
- **What are the key limitations/blockers at this time in NAS evolution? Key benefits?**

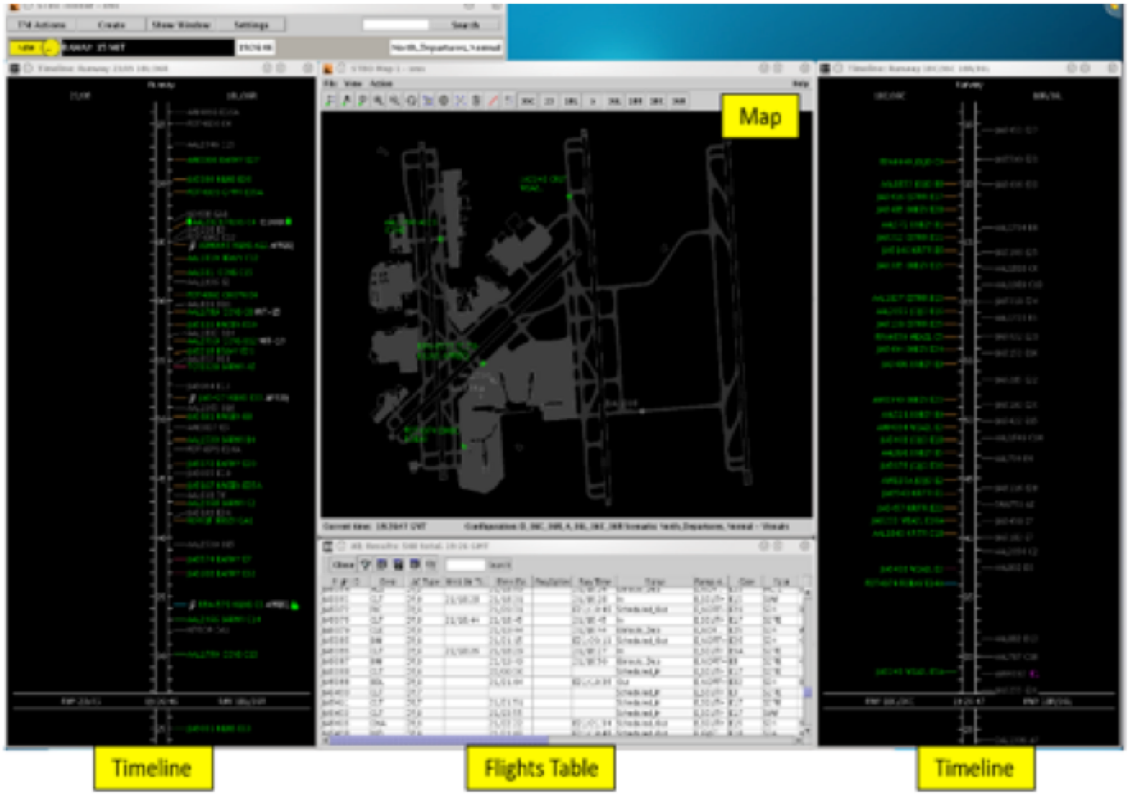
Collaborative Planning the Real-Time Flow



National Traffic Management Log (NTML) Restriction



STBO View



- Show Airspace and STBO from INT 10 and 12