

Collaborative Decision Making (CDM), Air Traffic Flow Management (ATFM), and Surface CDM

Presented to: A-CDM Conference, Lima, Peru

By: Bob Varcadipane, Manager, Airport Surface Efficiency Group, AJR-E, System Operations, FAA-ATO

Lenard Carter, CDM International National Traffic Management Specialist, AJR-13, System Operations Command Center, FAA-ATO

Date: August 26, 2015



Federal Aviation
Administration



Purpose

To provide conference participants with an overview of the FAA's CDM program, ATFM and Surface CDM



Contents

- CDM Frequently Asked Questions (FAQ)
- Air Traffic Flow Management (ATFM)
- Surface Collaborative Decision Making (S-CDM)
- Demonstration of CDM in Action
- Q & A



CDM Frequently Asked Questions

- Why was CDM created?
- Collaborative Decision Making (CDM) Defined
- What is the basis for CDM information exchange?
- How do you create a CDM culture?
- How does the FAA apply CDM?
- What is the CDM organizational structure?
- What is the CDM Governance structure?



Why was CDM created?

To achieve system goals

*Ensuring the safest, most
efficient National Aerospace
System in the world*

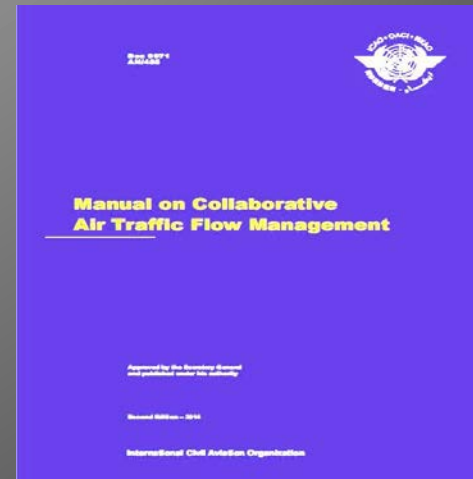


- *No single stakeholder has all the information, no two stakeholders have the same values, and all stakeholders interpret information through different experiences*
- *Sharing information, values and preferences, stakeholders learn from each other and build a common pool of knowledge*
- *Resulting in ATFM decisions and actions that are most valuable to the system*

CDM Defined by ICAO

Source: ICAO DOC 9971, Manual on Collaborative Air Traffic Flow Management, Second Edition 2014

A ***process*** focused on ***how to decide on a course of action*** articulated ***between two or more community members***. Through this process, ATM community members ***share information*** related to that decision and ***agree on and apply the decision-making approach and principles***.



CDM Defined by FAA

Source: FAA's CDM Leadership, Strategies, Structure and Guidelines, December, 2014, Version 4.0

- *Collaborative Decision Making (CDM) is defined as a **joint government/industry** initiative to improve the Air Traffic Management (ATM) system through **increased information exchange** among all stakeholders*
- *The CDM process involves sharing data to create a **common view** of the ATM system from which to base decisions, and to include stakeholders in the decision-making*
- *The purpose is to provide a Safe, Efficient and Secure National Airspace System that provides flight operators the flexibility to operate within their own capabilities and economic objectives. CDM transcends specific programs and is both a philosophy and a process by which to accommodate stakeholder preferences to the maximum extent possible*

CDM Membership Agreement for CDM Exchange of Data

The FAA's authority to enter into this agreement is governed by 49 U.S.C. 106 (l) and (m)

- Establishes the authority by which the FAA and industry exchange CDM data - identifies the rights and responsibilities of the parties
 - The exchange of CDM data is solely intended to support FAA and industry flow management decision making associated with the daily management of aircraft flight operations
 - Provides for common situational awareness among participating stakeholders, improved demand predictions, enhanced traffic management decisions and reduced delays
- CDM membership is predicated on a realized systemic benefit to the National Airspace System (NAS) resulting from the exchange of unique flight data between the requesting NAS stakeholder and the FAA



Creating a CDM Culture



Barriers to CDM Culture

- *Absence of Structure and Processes*
- *Individual Goals*
- *Hidden Agendas*
- *Operating on unverified Assumptions/Misconceptions*
- *Resistance to Trust*
- *Reluctance to Share Information*
- *Being Non-Committal*
- *Not Following Through*
- *Insensitivity to Individual, Country and Organizational differences*
- *Other?*

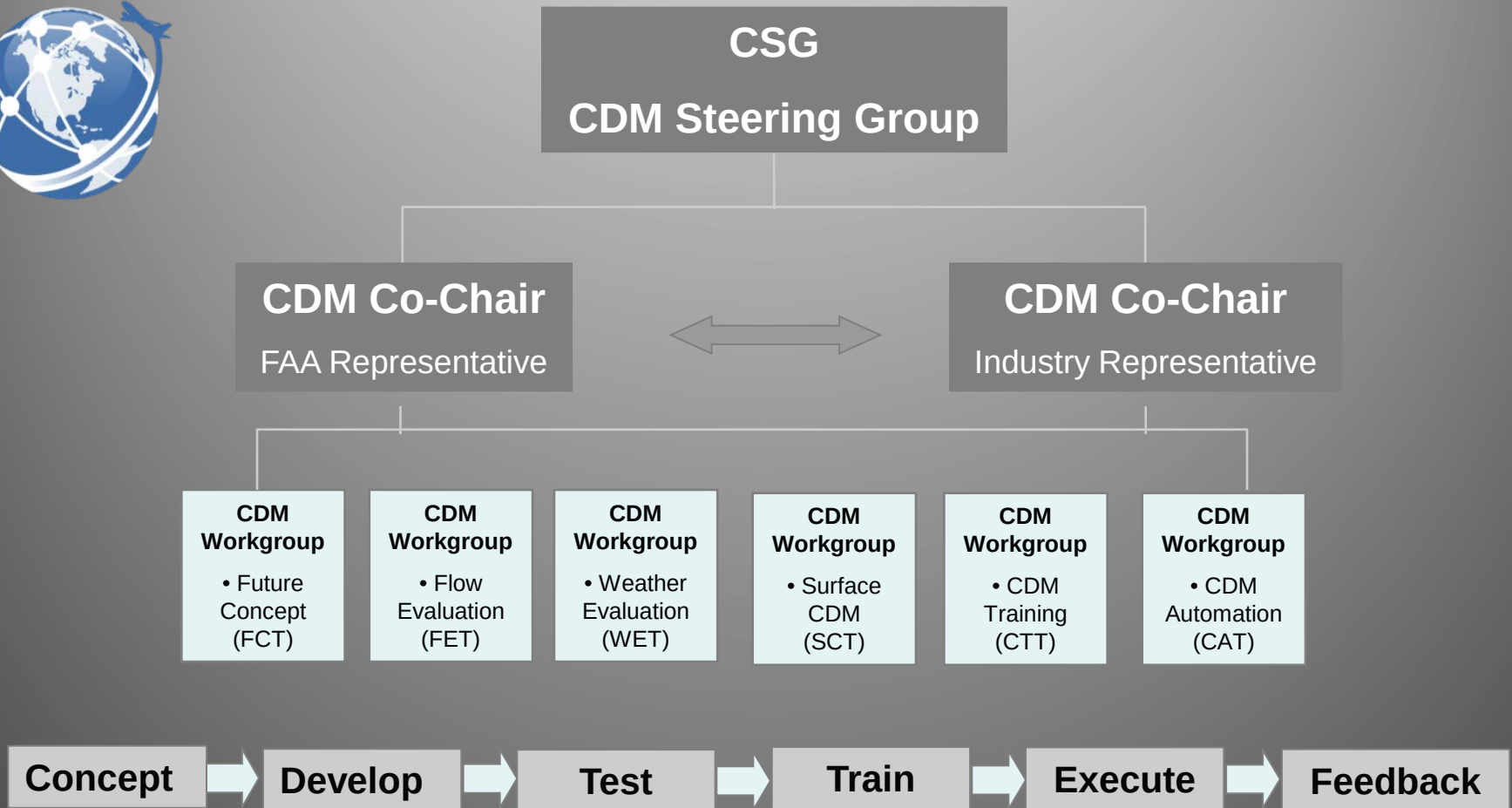
CDM Culture Attributes

- *Structure and Process Buy-in*
- *Goal Harmonization*
- *Transparency*
- *Open Communication*
- *Trust Building*
- *Sharing Information*
- *Taking Ownership*
- *Supporting Decisions i.e. Accountable*
- *Treating each other as partners (and being country-neutral)*
- *Other?*

Applying CDM with Stakeholders

Application	Frequency
<i>Operational Planning Telecoms (OPT)</i>	Daily
<i>National System Reviews (NSR)</i>	Daily
<i>CDM Steering Group (CSG) and Sub-Teams</i>	Monthly
<i>National Customer Forums (NCF)</i>	Monthly
<i>CDM Review</i>	Annually
<i>End of Season Review</i>	Annually

CDM Organizational Structure



CDM Governance and Leadership

Source: FAA's CDM Leadership, Strategies, Structure and Guidelines, December, 2014, Version 4.0

CDM Steering Group (CSG), as the oversight body of CDM:

- *Establishes the strategy objectives for the CDM community*
- *Provides guidelines for FAA and Industry interaction and engagement*
- *Provides direction, guidance and processes to CDM Sub Teams*
- *Provides the FAA with input on prioritization and tasking to evolve the NAS*
- *Shares leadership (FAA and Industry)*
- *Votes on recommendations/motions*
 - *6 CSG members have voting rights (3 FAA, 3 industry)*
 - *Clear majority is required to carry a recommendation/motion*

CDM and ATFM



CDM

Collaborative
Decision Making



Air Traffic Control System Command Center



FAA
Air Traffic Organization

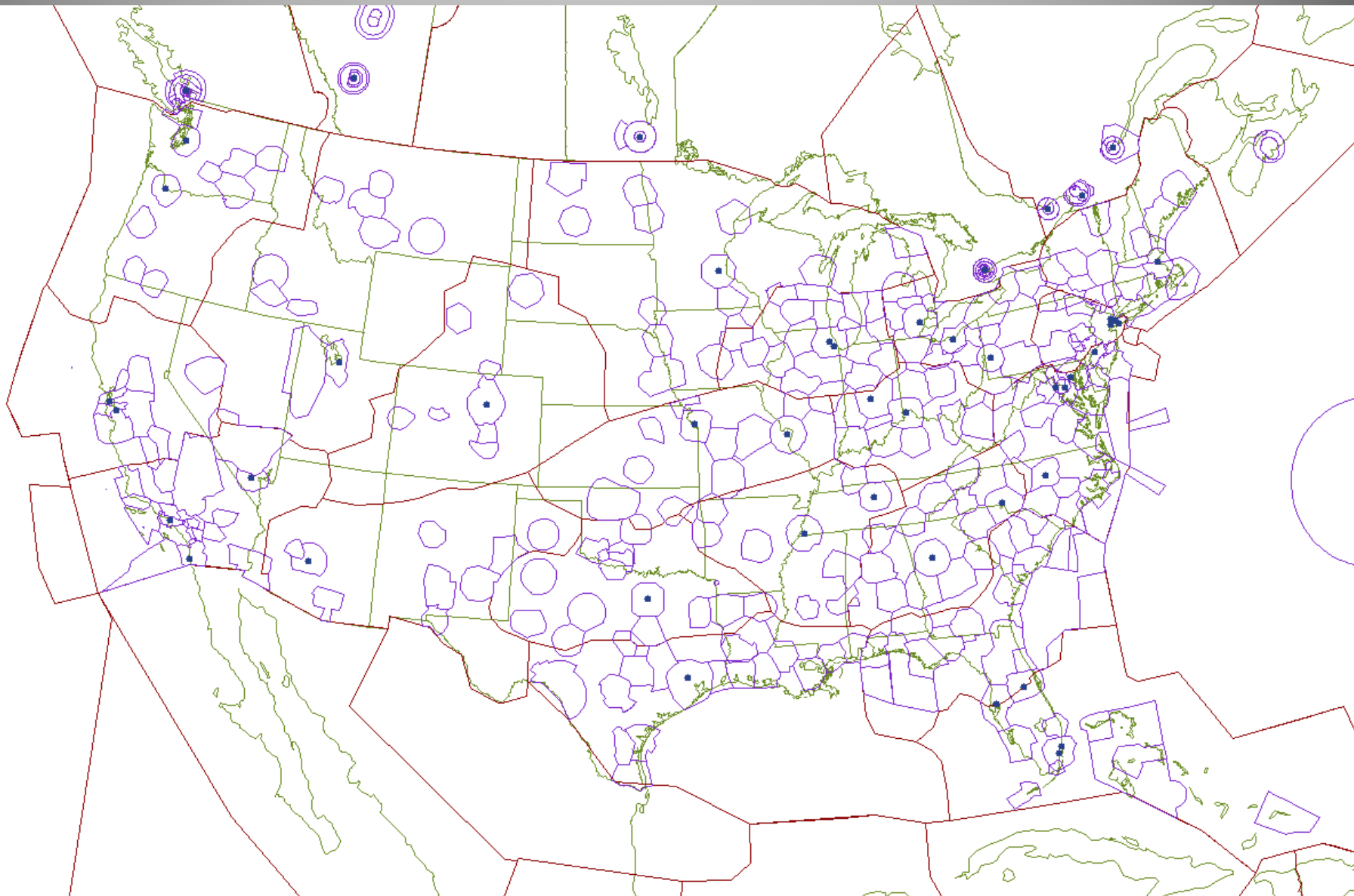
The Air Traffic Control System Command Center's Mission is to balance safety requirements with demand and capacity, through Strategic, Pre-Tactical, Tactical and Post-Operations analysis management.

We accomplish our mission through collaborating with our Stakeholders to minimize delays and congestion. Supporting a safer and more efficient National Airspace System.

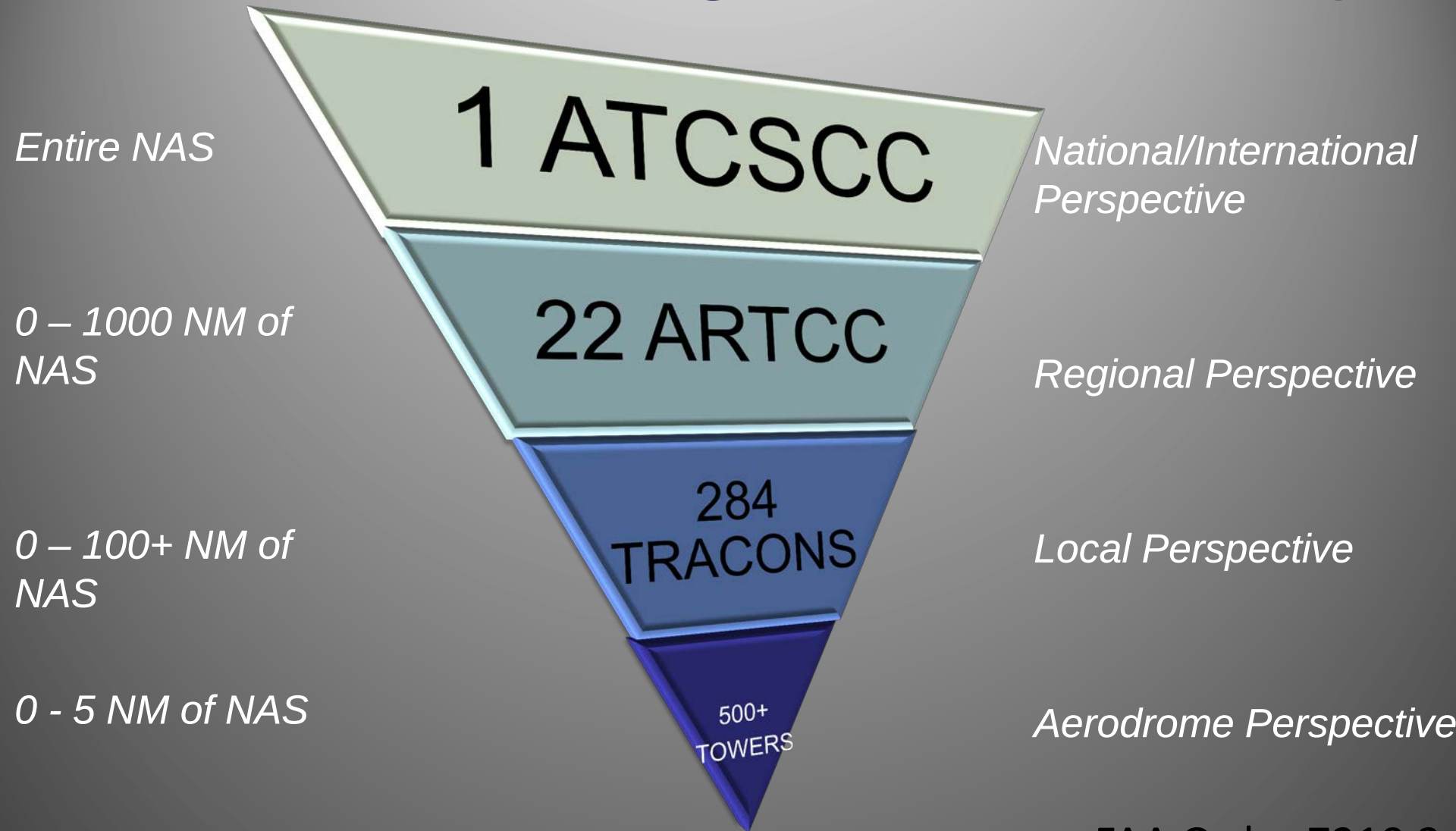


**Federal Aviation
Administration**

The U.S. National Airspace System



Air Traffic Management Hierarchy



FAA Order 7210.3



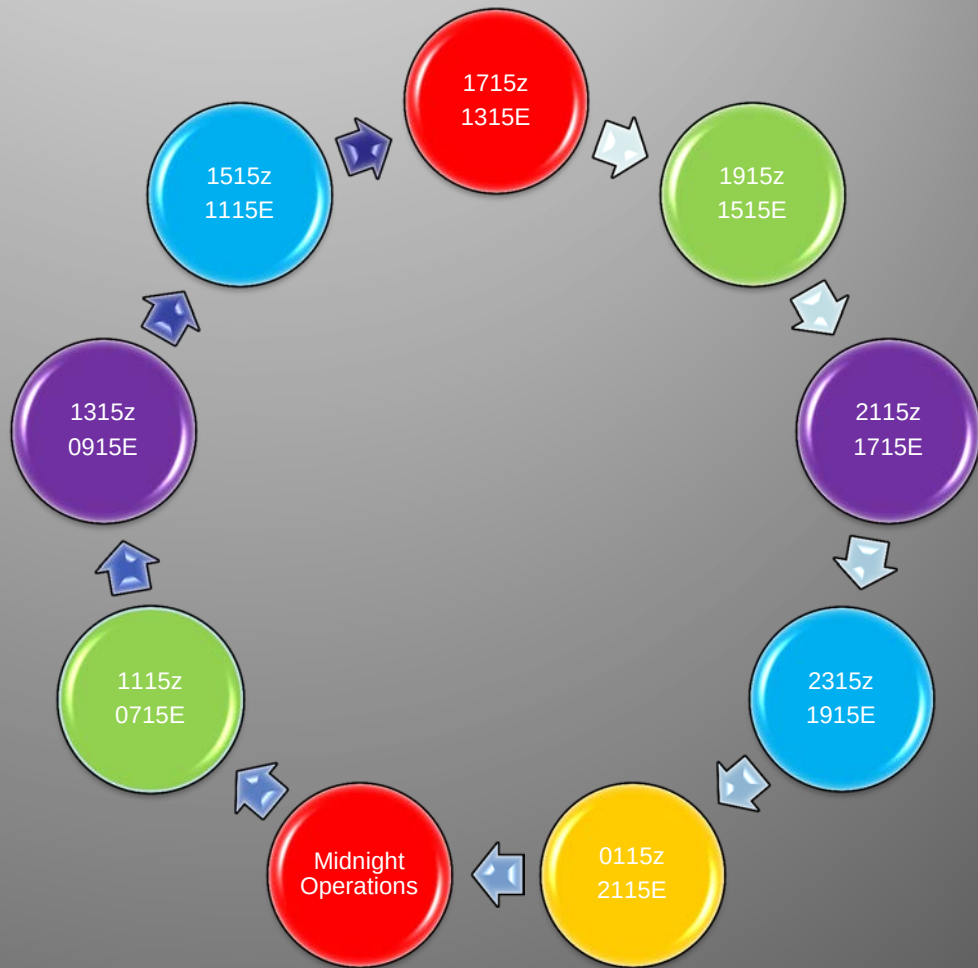
Federal Aviation
Administration

Collaborative Planning Process



Federal Aviation
Administration

Operations Planning Telcon (OPT)



Midnight Cargo Operations

Next Day Outlook

- Planner facilitates OPT
- 8 OPT Conducted Daily
- Telcons/Terminal/Severe WX
- 25-100+ Telcons Daily
- 10 – 100+ Participates
- OPT adjusted for DST
- Hotlines

Preparation & Fact Gathering occurs between OPT

- Planner
- Terminal
- Severe Weather Unit
- National Weather Service



Federal Aviation
Administration



Traffic Management Initiatives (TMI)



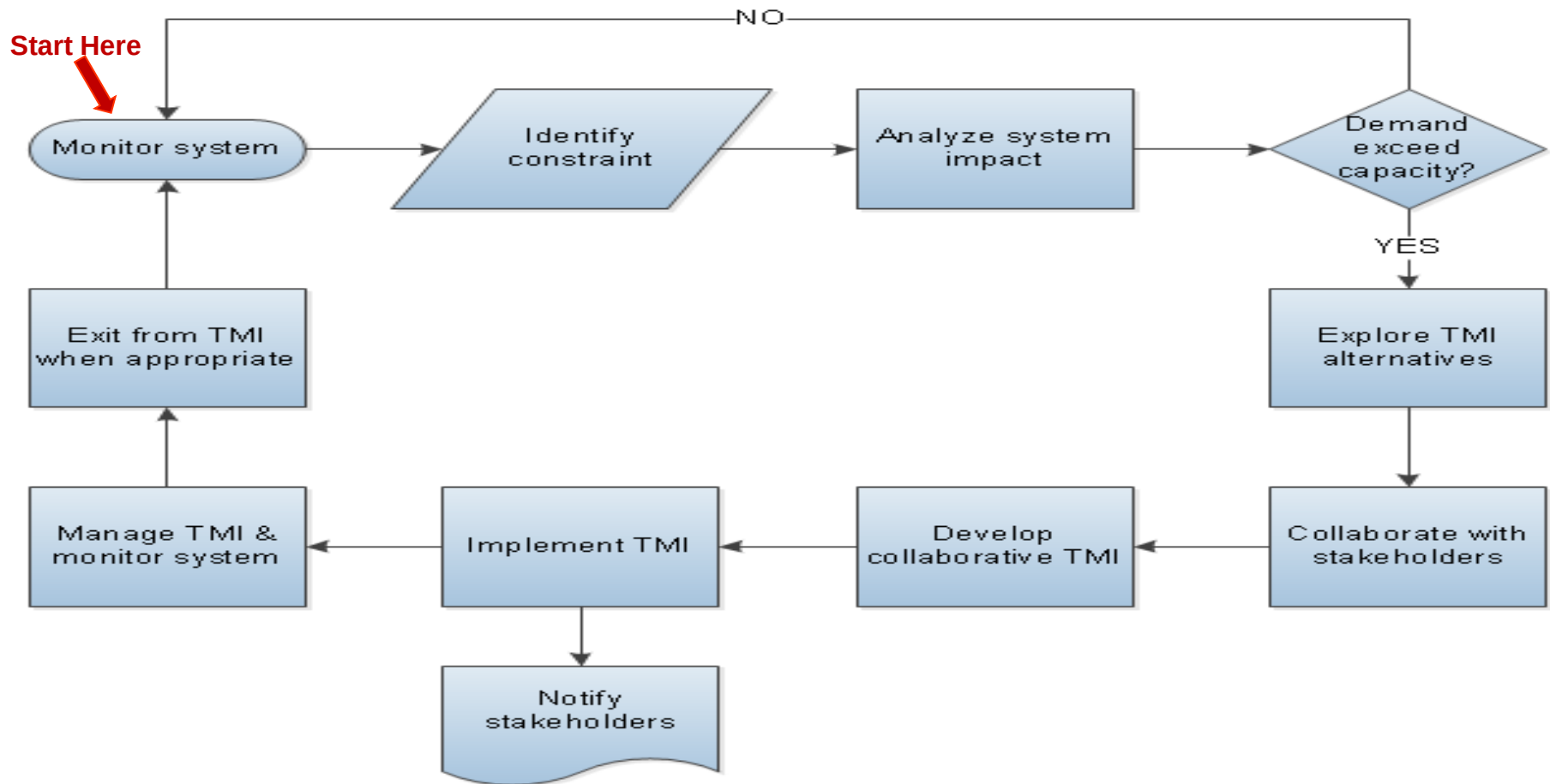
FAA
Air Traffic Organization

- *TMIs are used to balance demand with capacity*
- *Shared Awareness any TMI creates an impact on our stakeholders*
- *“Policy” always seek the least restrictive TMI*



**Federal Aviation
Administration**

CDM and ATFM



ATCSCC International Operations Position (IO)

Can be reached anytime

Contact information (540) 359-3158 or (540) 359-3158

Email information: <9-ATOR-HQ-ATCSCC-AT-NOM@faa.gov

- Equipment outages
- Airport incidents
- Aeronautical Fixed Telecommunication Network (AFTN) interruption/outages
- Staffing/Labor issues

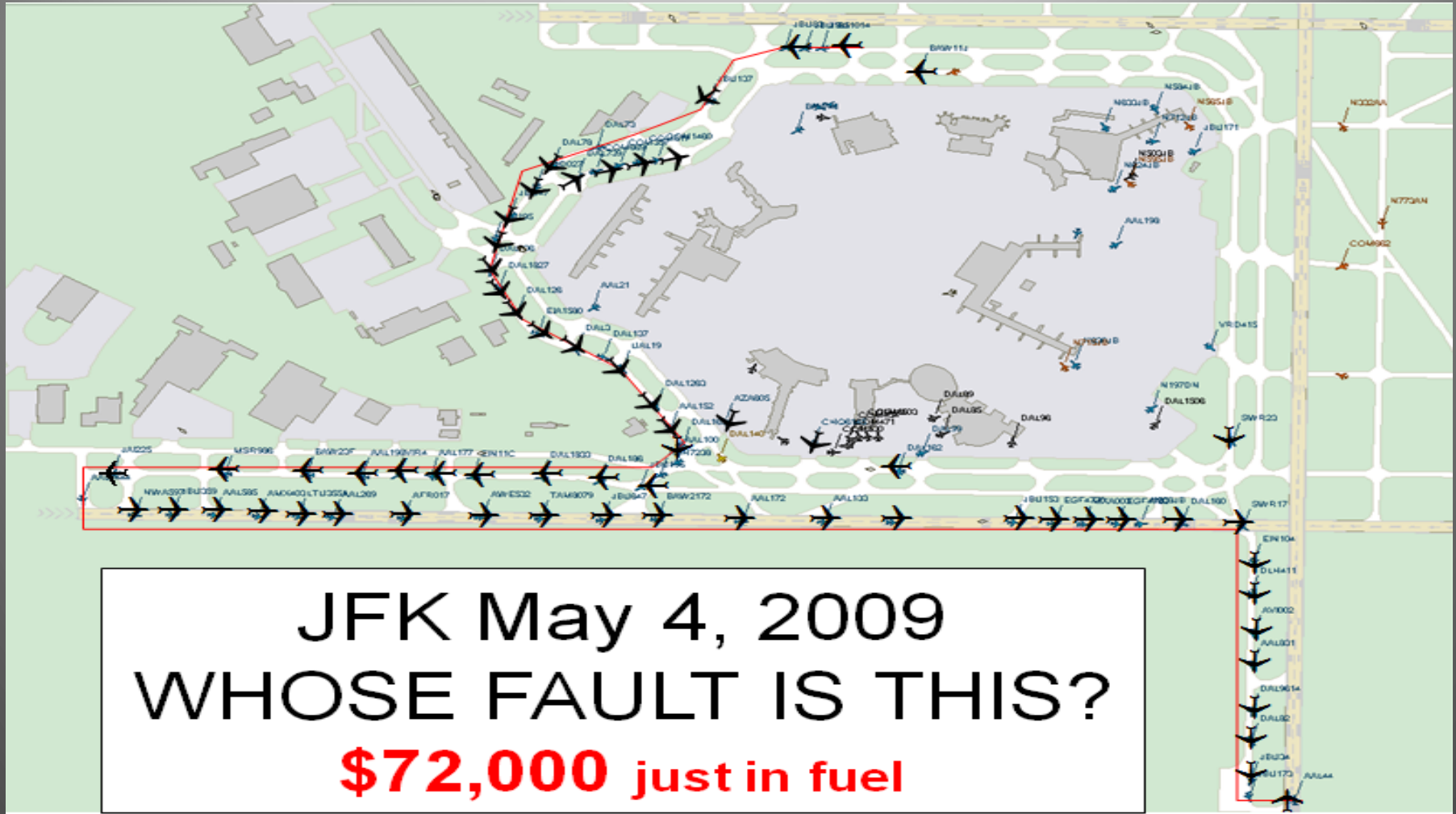
Surface CDM (S-CDM)



CDM

Collaborative
Decision Making

Surface Metering – Why?





Surface CDM Metering Concept

- The Surface CDM Metering concept provides the basis for more efficient management of traffic flows on the surface at U.S. airports while maintaining or increasing safety
- Surface CDM Metering is founded on the premise that access to airport aircraft surface surveillance data (Movement Area and Non-Movement Area) coupled with the timely sharing of accurate operational data among ATC, Airport Operators, Flight Operators, and other Stakeholders, affords the opportunity to better predict and manage demand on the airport surface



Surface Metering - Benefits

Surface Metering produces more efficient surface operations which will create benefits in the following areas: ie. KEWR, KJFK

- Improved predictability for ATC, Traffic Management, Flight and Airport Operators, and the traveling public
- Reduced taxi-out times, with associated reductions in fuel consumption, emissions, and noise
- Enhanced safety through more orderly surface traffic management and better sector demand prediction
- Enhanced air traffic management productivity through improved real-time data exchange and use of electronic flight data in the ATCT



S-CDM Foundation

Source: U.S. Airport Surface Collaborative Decision Making (CDM) Concept of Operations (ConOps) in the Near-Term, FAA Air Traffic Organization, Surface Operations Directorate, July 26, 2013

S-CDM is founded on the premise that:

- Access to airport aircraft surface surveillance data
- Coupled with the timely sharing of accurate operational data among the FAA, Airport Operators, Flight Operators, pilots, and other Stakeholders
- Affords the opportunity to better predict and manage real demand in the movement and non-movement areas on the airport surface

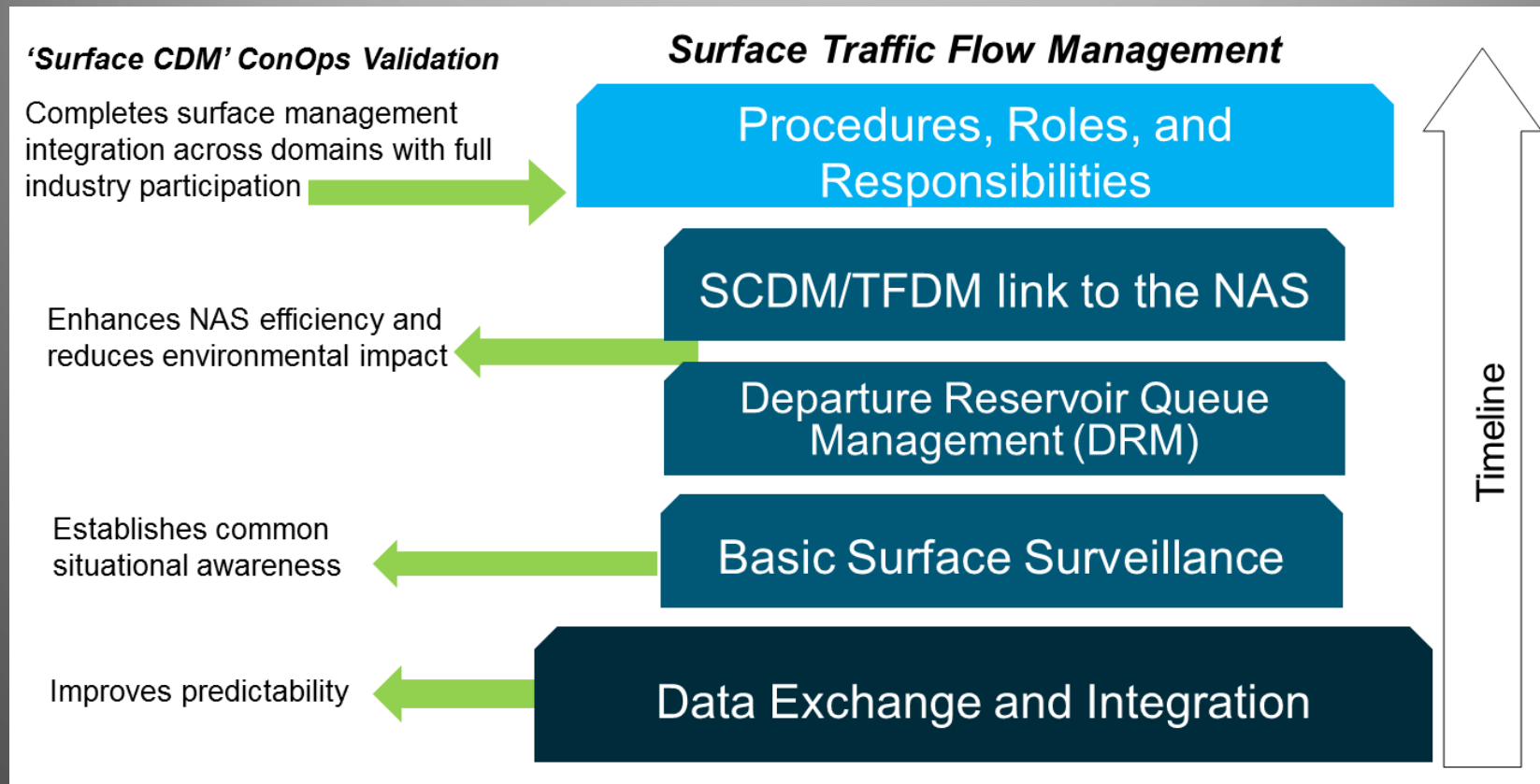
S-CDM Capabilities and Procedures

- Transparent, real-time sharing of current and forecast operational information in order to improve situational awareness among all Stakeholders and enable continuous, accurate predictability of airport demand and capacity
- Tactical and strategic management of airport aircraft traffic flows utilizing a Departure Reservoir Management (DRM) capability to better manage departure queues to eliminate excessive taxi-out times and measurably improve departure efficiency
- Management of arrival traffic flows to increase total airport throughput with balanced arrival and departure demand

S-CDM Capabilities and Procedures

- Analysis, measurement and monitoring capabilities that position Stakeholders to better understand operational performance and the impact on the NAS utilizing a “Scorecard” that provides an objective, transparency measurement of the performance of the local Stakeholders
- Global harmonization which facilitates standardization across international Airport CDM programs and the U.S. Surface CDM concept and support ICAO ASBU “block 0” goals

S-CDM Planned Objectives



S-CDM Enhancements

- **Involves increased Automated Data Exchange among all Surface Stakeholders**
 - Reportable aircraft movement events (i.e., TMAT- Target Movement Area entry Time)
- **Achieves operational efficiency through Surface Metering**
 - Improved coordination between ATC facilities
- **Utilizes a local Departure Reservoir Coordinator (DRC) manages airport Surface metering**
- **Collaboration is conducted with all Stakeholders based on CDM philosophy**
- **Performance is measured for post-operative analysis and performance reporting**

Surface Metering

Utilizes the CDM philosophy of collaborative decision making with all stakeholders

Surface Metering

- **Surface data exchange is required to:**
 - Increase airport efficiency/productivity safely and efficiently
 - Provide a common shared situational awareness
 - Improve operational predictability for strategic planning
 - Improve post-operational analysis with greater granularity of available data points

S-CDM Data Elements

Surface CDM Data Elements for Traffic Flow Data Management (TFDM) Early Implementation

Actual In-Block Time (AIBT)	Flight Cancellation
Actual Landing Time (ALDT)	Flight Intent
Actual Off-Block Time (AOBT)	Gate Assignment (Arrival and Departure)
Actual Take-Off Time (ATOT)	Initial Off-Block Time (IOBT)
Aircraft Tail / Registration Number	Target Movement Area entry Time (TMAT)
Earliest Off-Block Time (EOBT)	Off-Block Time – Estimated

SCT Recommendation CDM

CSG APPROVED!!!

- Recommendation: Airport Authorities as Potential CDM Participants
 - Criteria for Eligible Airports
 - Airport CDM Members – Core airports plus other airports approved by the CSG
 - Airport CDM Participants - Airports operationally coupled with Airport CDM Member airports

SCT Recommendation CDM

CSG APPROVED!!!

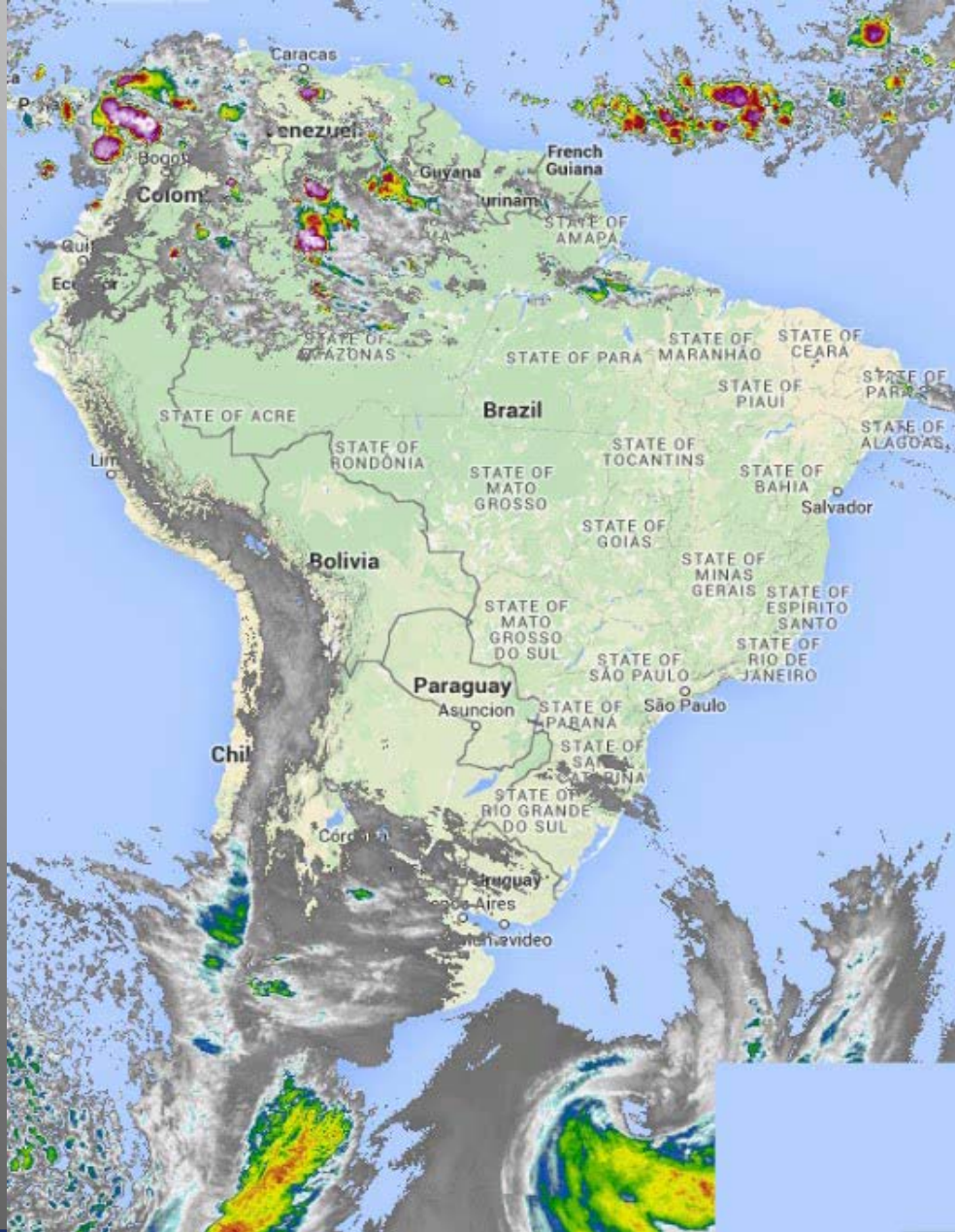
- Recommendation: Airport Authorities as Potential CDM Participants (Continued)
 - Data Elements for Airport CDM Members to Share
 - Number of diversions that can be accepted
 - Gate availability (from the vantage point of the Airport)
 - De-icing throughput rates
 - Surface conditions
 - Construction (runways, taxiway closure)
 - Remote/overnight parking (Includes availability of air stairs and buses)
 - Scheduled closures (one week in advance or when available)
 - Flight delays
 - Local advisories – both airside/landside
 - Unscheduled operations data
 - Customs and Immigration throughput rates
 - Parking capacity
 - Flight operations CDM data

Weather Event Involving CDM



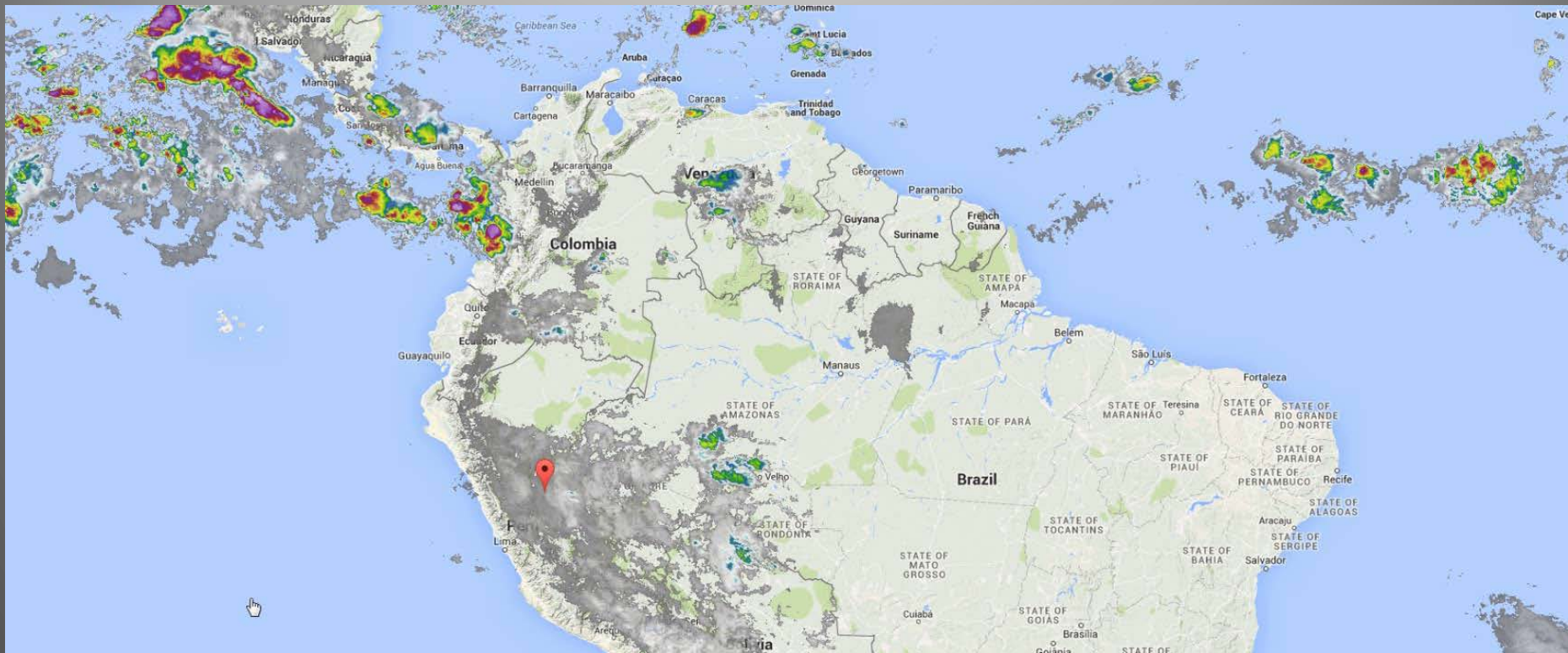
CDM

Collaborative
Decision Making



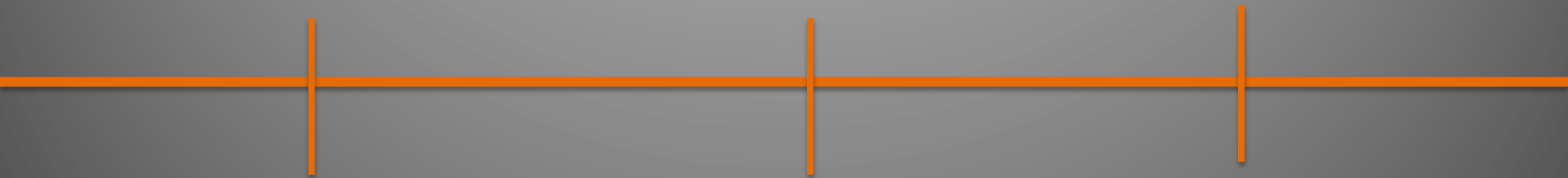
Federal Aviation
Administration

Friday August 21, 2015



Federal Aviation
Administration

Strategic Planning



Week

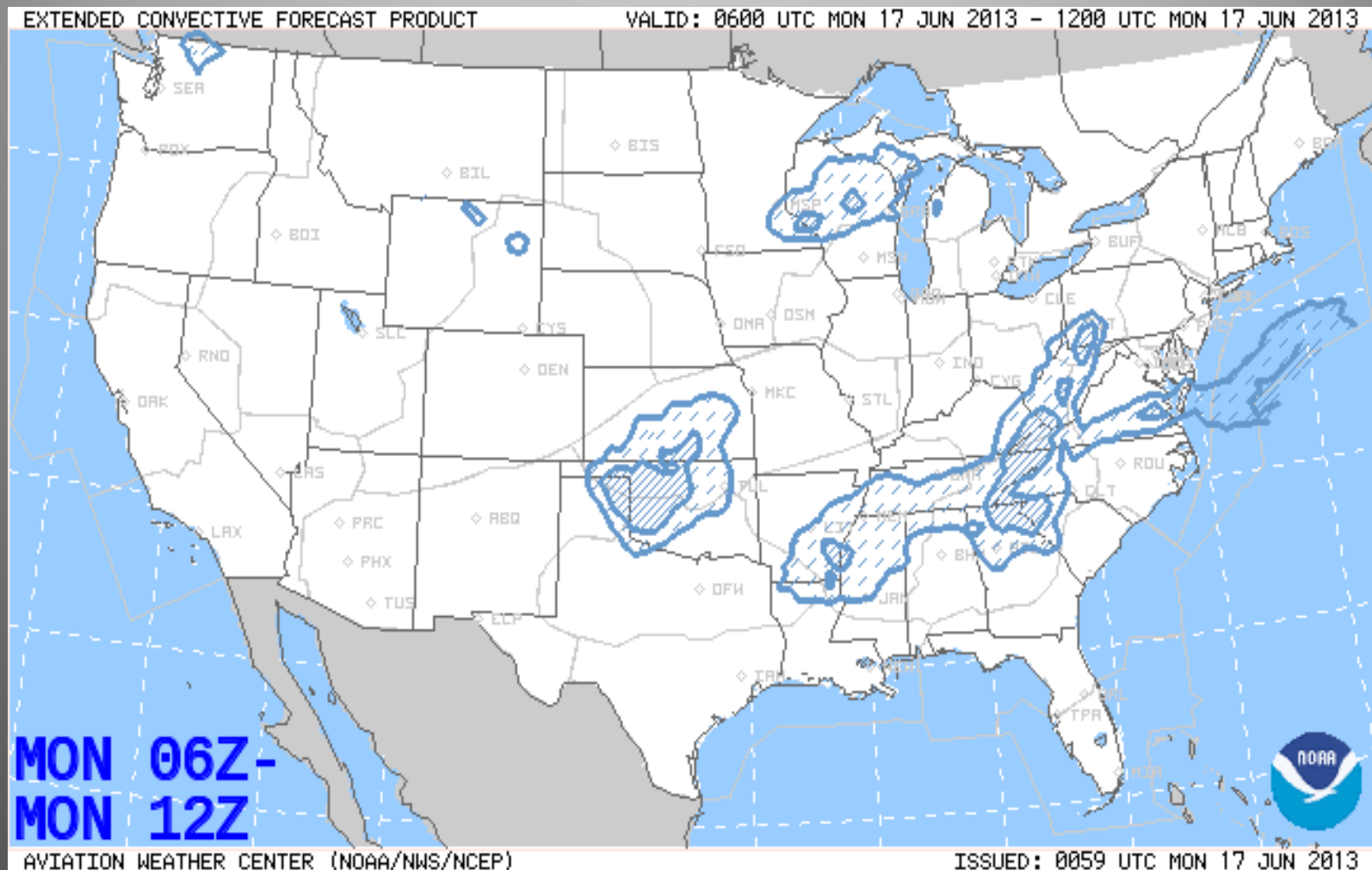
Day

Hour -12



Federal Aviation
Administration

Strategic Planning



Federal Aviation
Administration

ATCSCC Operations Plan

TERMINAL CONSTRAINTS:

ATL/CLT-TSRA-SHRA

MEM/DFW-SHRA-VCTS

SFO-LOCIGS

FLL/DEN/PDX/LAS-RWY CONSTR

TEB-RWY 1/19 CLOSED 17/0930-1900Z

EN ROUTE CONSTRAINTS:

ZTL/ZME/ZKC/ZFW-TSTMS

1. ROUTES

AFTER 1000 -ELP PLAYBOOK PROBABLE

AFTER 1000 -LNK PLAYBOOK PROBABLE

AFTER 1000 -MCI WEST PLAYBOOK PROBABLE

2. ZOA

AFTER 1600 -SFO GROUND STOP POSSIBLE



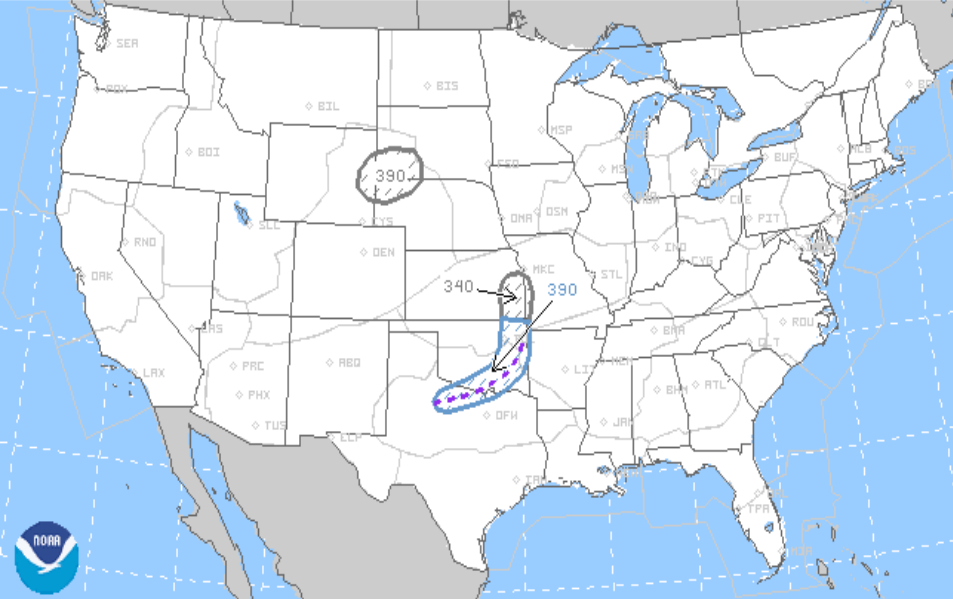
Federal Aviation
Administration

Operational Modeling and Planning

Hour - 12 to 4



Federal Aviation
Administration



AVIATION WEATHER CENTER (NOAA/NWS/NCEP)

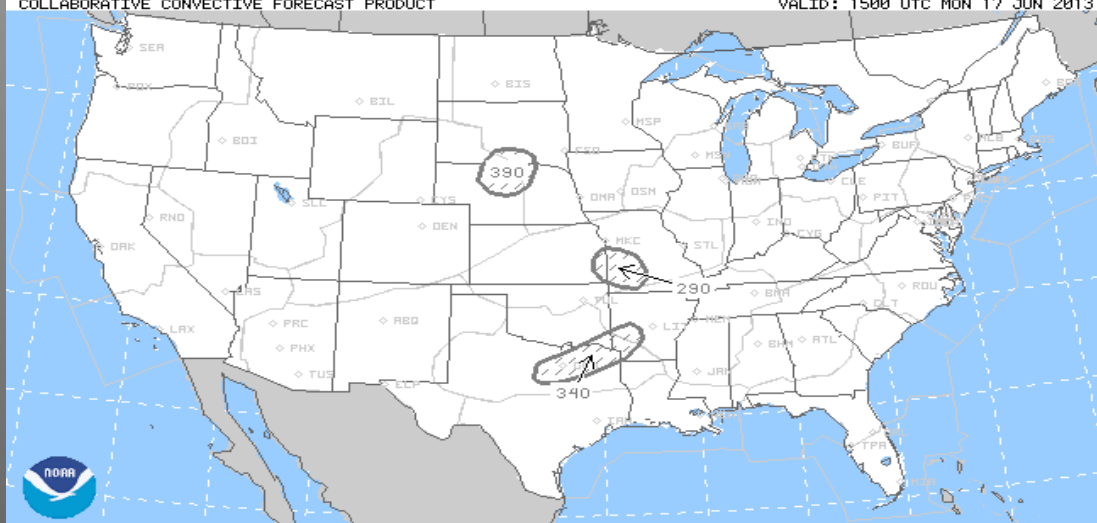
ISSUED: 0700 UTC MON 17 JUN 2013

COLLABORATIVE CONVECTIVE FORECAST PRODUCT

AVIATION WEATHER CENTER (NOAA/NWS/NCEP)
VALID: 1500 UTC MON 17 JUN 2013

ISSUED: 0700 UTC MON 17 JUN 2013

4 HOUR



AVIATION WEATHER CENTER (NOAA/NWS/NCEP)

ISSUED: 0700 UTC MON 17 JUN 2013

6 HOUR

8 HOUR

Federal Aviation
Administration

ATCSCC Operations Plan

TERMINAL CONSTRAINTS:

ATL/CLT/FLA-TSRA

MEM/DFW-VCTS

SFO-LOCIGS

FLL/DEN/PDX/LAS-RWY CONSTR

TEB-RWY 1/19 CLOSED 0930-1900Z

EN ROUTE CONSTRAINTS:

ZTL/ZME/ZKC/ZFW-TSTMS

1. ROUTES

UNTIL 1400 -NE TO ZAB/ZLA

UNTIL 1400 -SE TO ZAB/ZLA

UNTIL 1400 -LNK PLAYBOOK POSSIBLE

2. ZFW

UNTIL 1430 -DFW GROUND STOP EXPECTED

2. ZOA

AFTER 2000 -SFO GROUND STOP/DELAY PROGRAM
POSSIBLE



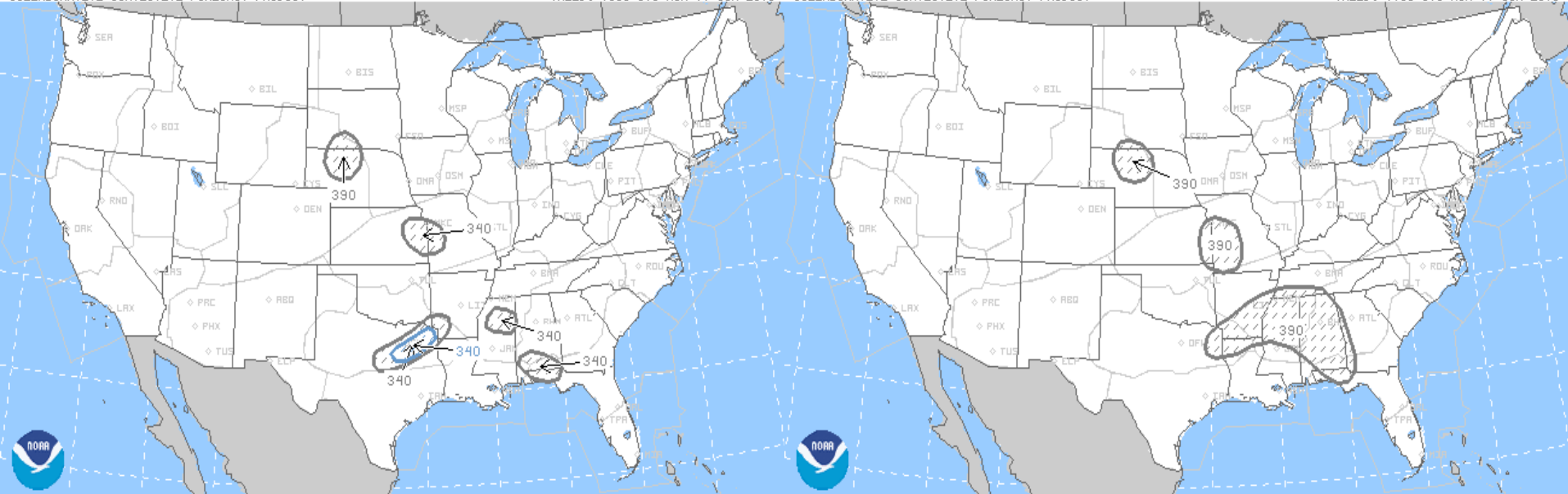
Federal Aviation
Administration

Planning → Tactical

Hour - 4 to 2



Federal Aviation
Administration



AVIATION WEATHER CENTER (NOAA/NWS/NCEP)

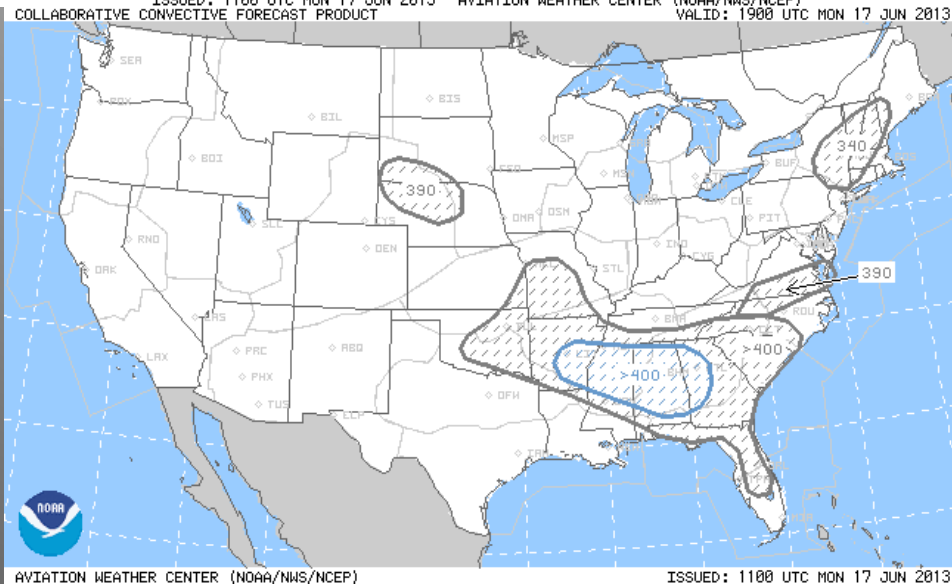
ISSUED: 1100 UTC MON 17 JUN 2013

AVIATION WEATHER CENTER (NOAA/NWS/NCEP)

VALID: 1900 UTC MON 17 JUN 2013

ISSUED: 1100 UTC MON 17 JUN 2013

4 HOUR



AVIATION WEATHER CENTER (NOAA/NWS/NCEP)

ISSUED: 1100 UTC MON 17 JUN 2013

8 HOUR

6 HOUR



Federal Aviation
Administration

ATCSCC Operations Plan

TERMINAL CONSTRAINTS:

ATL/CLT/FLA/MEM-TSRA

DFW-VCTS

SFO-LOCIGS

FLL/DEN/PDX/LAS-RWY CONSTR

TEB-RWY 1/19 CLOSED 0930-1900Z

EN ROUTE CONSTRAINTS:

ZTL/ZME/ZKC/ZFW-TSTMS

1. ROUTES

UNTIL 1500 -EAST 2 DFW

UNTIL 1600 -ZTL 2 SW

UNTIL 0430 -EWR/JFK WIND ROUTES

2. ZTL

AFTER 1700 -ATL GROUND STOP/ GROUND DELAY PROGRAM POSSIBLE

AFTER 1700 -CLT GROUND STOP/ GROUND DELAY PROGRAM POSSIBLE

3. ZFW

UNTIL 1430 -DFW GROUND STOP EXPECTED

4. ZOA

AFTER 2000 -SFO GROUND STOP/DELAY PROGRAM POSSIBLE



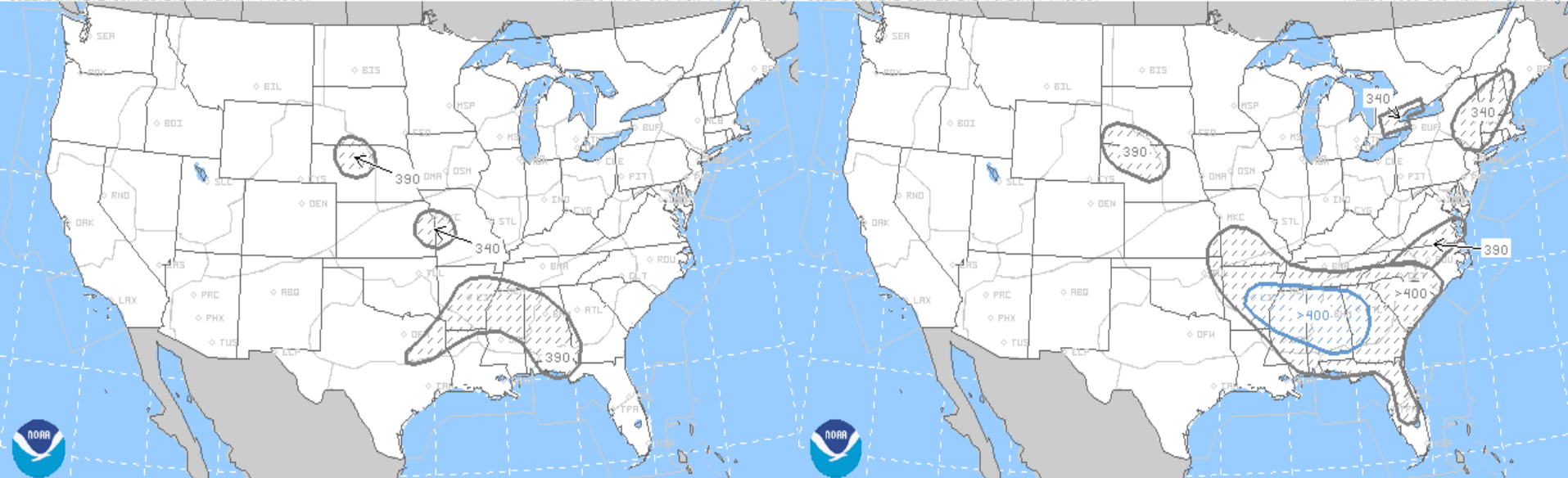
**Federal Aviation
Administration**

Tactical Adjustments

Hour < 1



Federal Aviation
Administration



AVIATION WEATHER CENTER (NOAA/NWS/NCEP)

ISSUED: 1300 UTC MON 17 JUN 2013

AVIATION WEATHER CENTER (NOAA/NWS/NCEP)

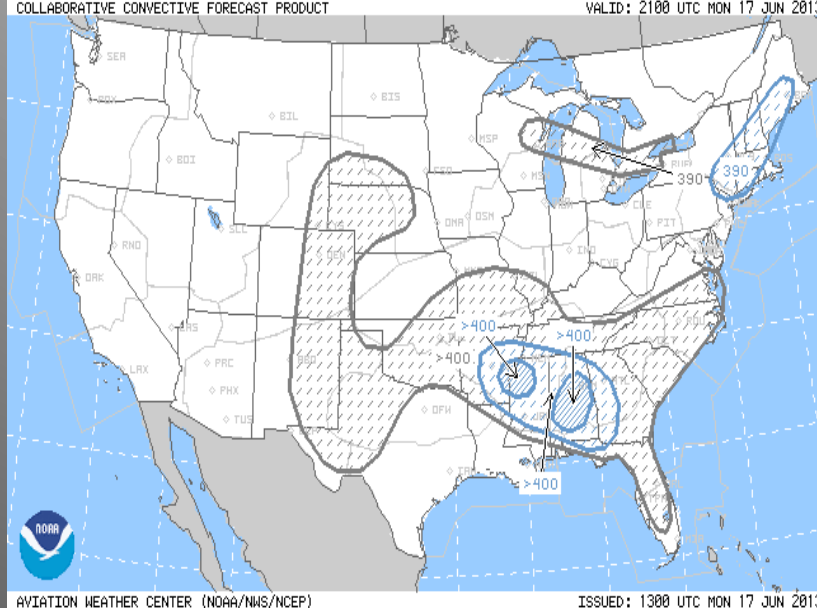
ISSUED: 1300 UTC MON 17 JUN 2013

COLLABORATIVE CONVECTIVE FORECAST PRODUCT

VALID: 2100 UTC MON 17 JUN 2013

4 HOUR

6 HOUR



AVIATION WEATHER CENTER (NOAA/NWS/NCEP)

ISSUED: 1300 UTC MON 17 JUN 2013

8 HOUR



Federal Aviation
Administration

ATCSCC Operations Plan

TERMINAL CONSTRAINTS:

ATL/CLT/FLA/MEM-TSRA

DFW-VCTS

SFO-LOCIGS

FLL/DEN/PDX/LAS-RWY CONSTR

TEB-RWY 1/19 CLOSED 0930-1900Z

EN ROUTE CONSTRAINTS:

ZTL/ZME/ZKC/ZFW-TSTMS

1. ROUTES

UNTIL 1500 -EAST 2 DFW

UNTIL 1600 -ZTL 2 SW

UNTIL 0430 -EWR/JFK WIND ROUTES

2. ZTL

AFTER 1700 -ATL GROUND STOP/ GROUND DELAY PROGRAM POSSIBLE

AFTER 1700 -CLT GROUND STOP/ GROUND DELAY PROGRAM POSSIBLE

3. ZFW

UNTIL 1430 -DFW GROUND STOP EXPECTED

4. ZOA

AFTER 2000 -SFO GROUND STOP/DELAY PROGRAM POSSIBLE



**Federal Aviation
Administration**

Post Operations Analysis

- ➔ Determine the effectiveness of ATFM measures
- ➔ Compare the anticipated outcome with the actual measured outcome in terms of delay, route extension or other key performance indicators
- ➔ Delay Metrics
- ➔ Replay Capability



Weather Event Involving CDM

August 20, 2015



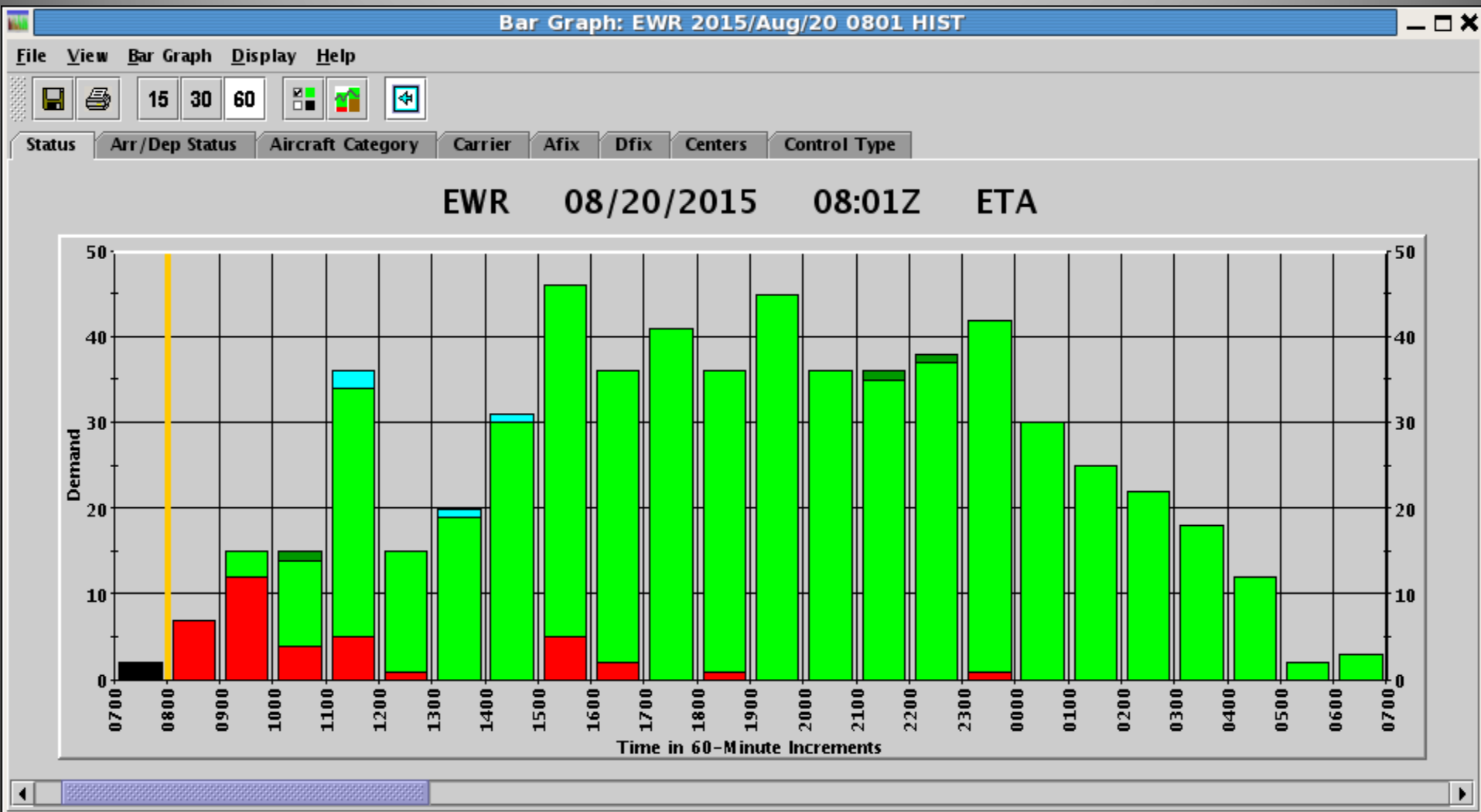
CDM

Collaborative
Decision Making

MTO: All

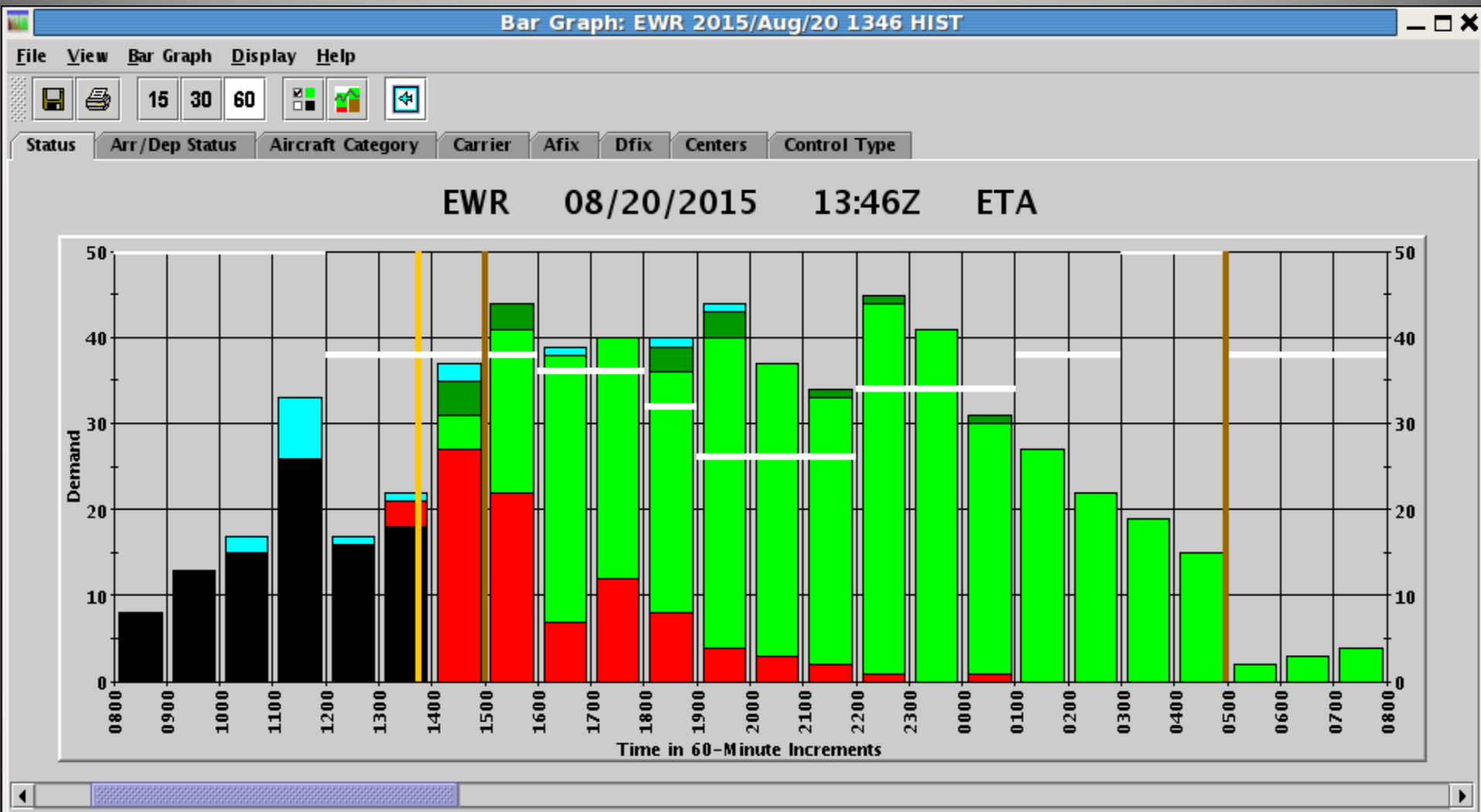
[illegible]

EWR Traffic Demand 8/20/15



EWR Demand and Capacity

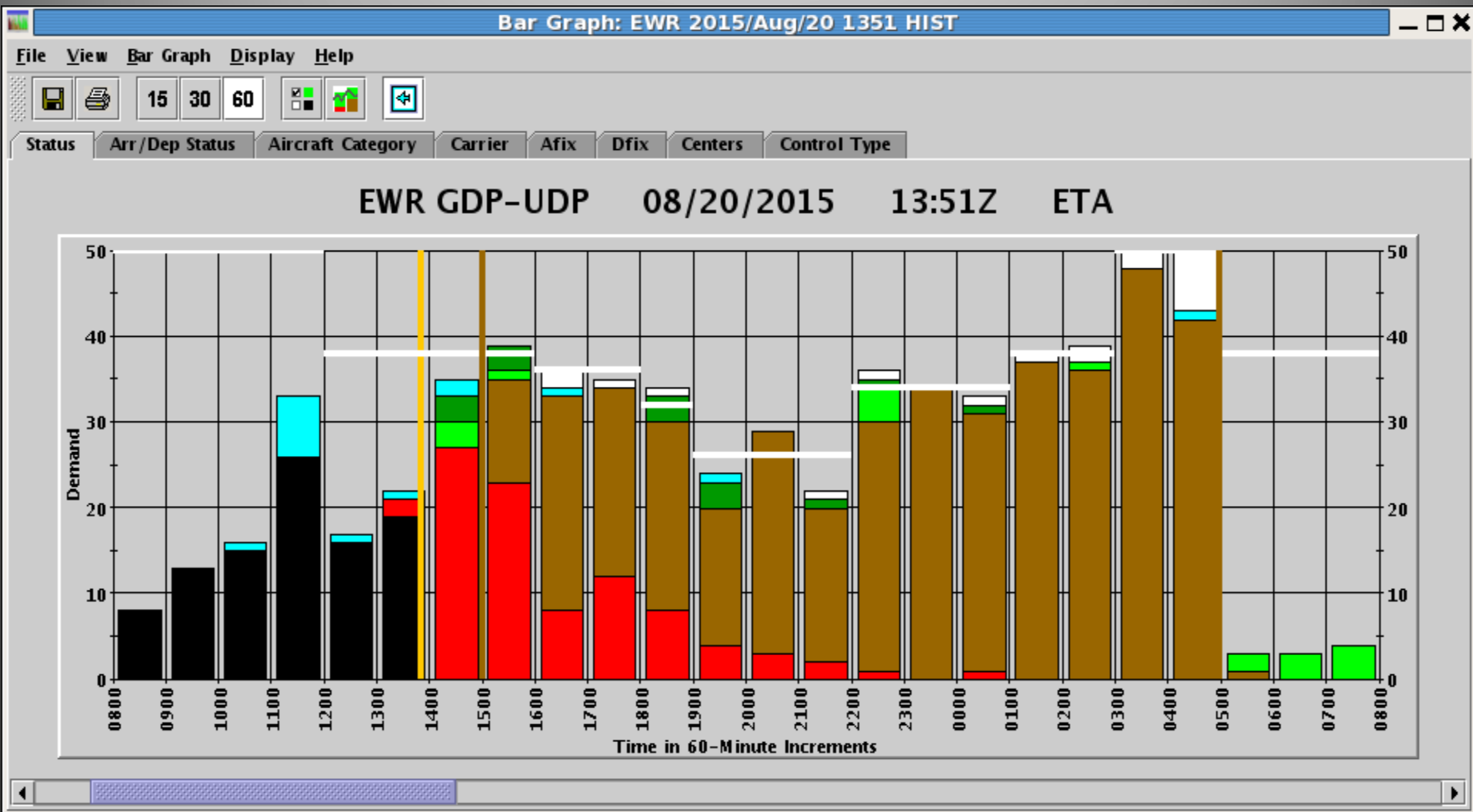
Proposal Issued



EWR Ground Delay Program

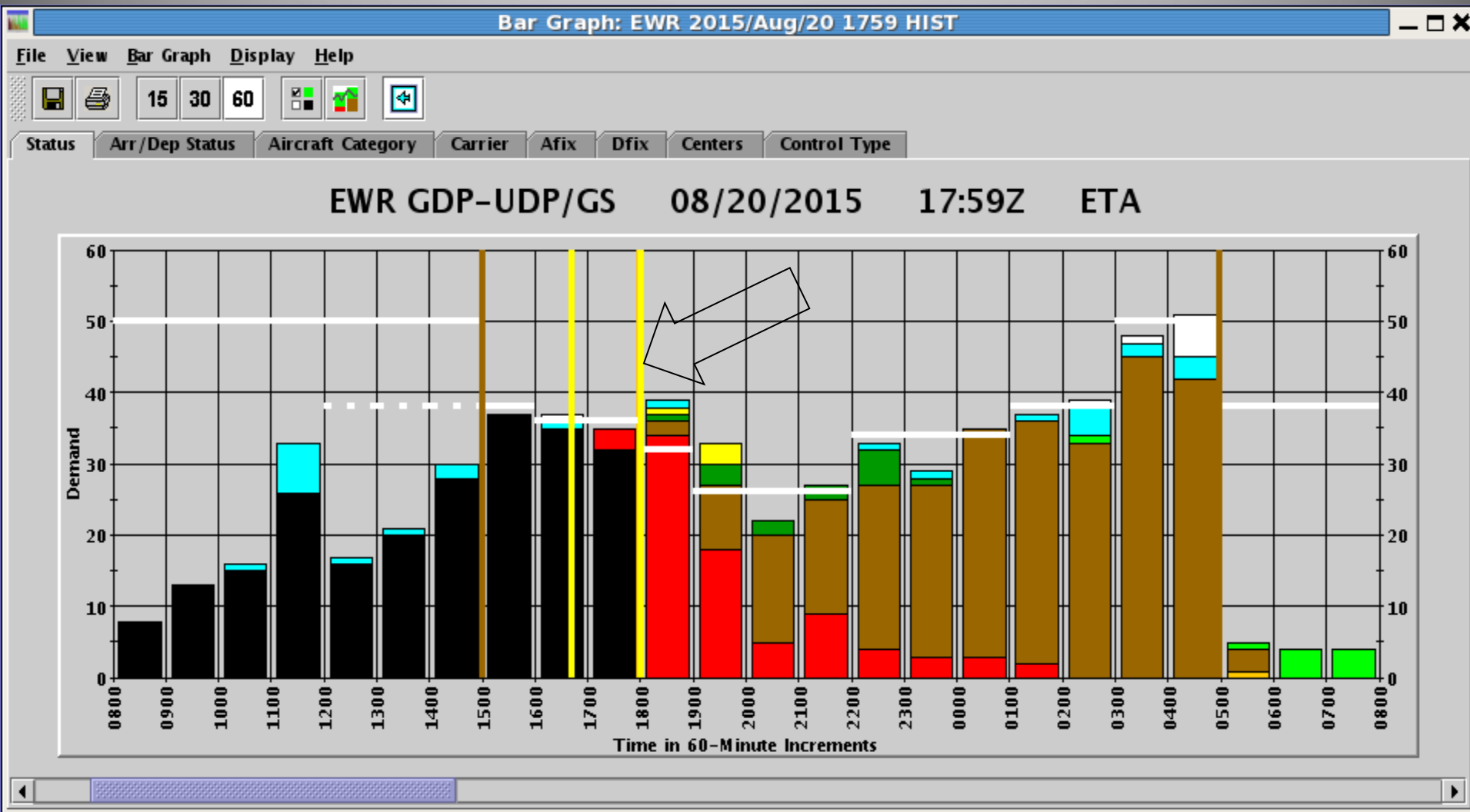
Cause: Weather/Thunderstorms

Bar Graph: EWR 2015/Aug/20 1351 HIST



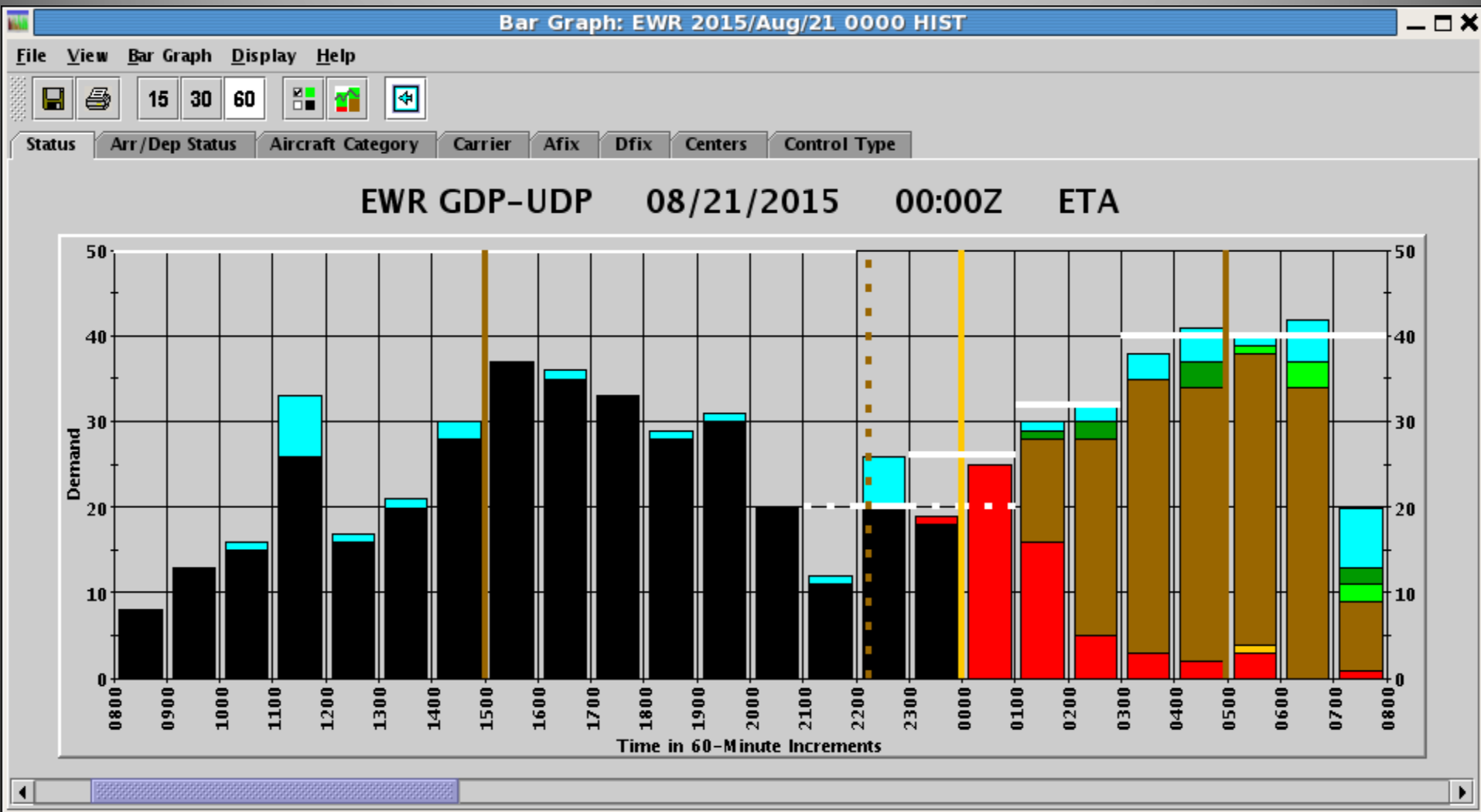
EWR Ground Stop

Cause: Over demand

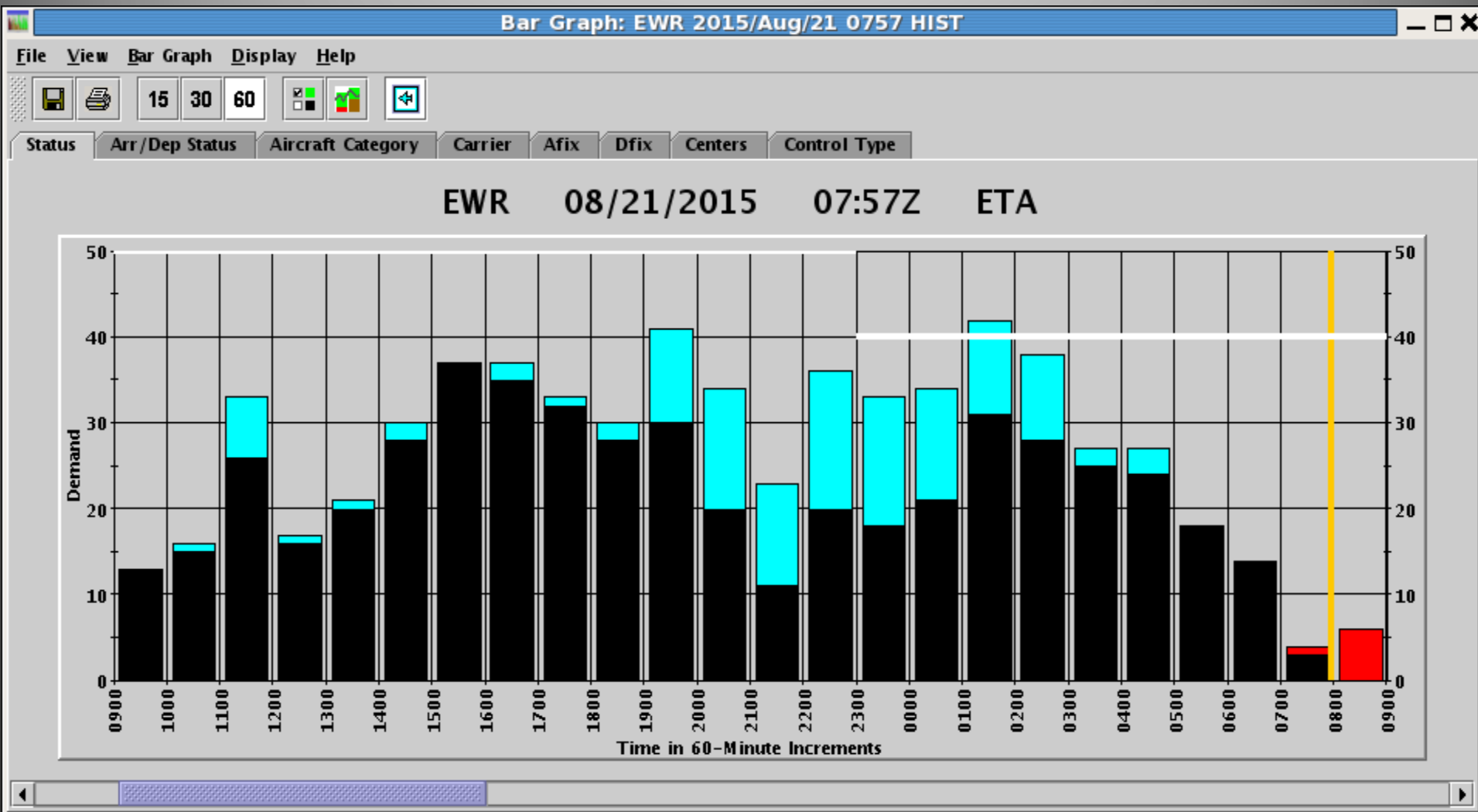


EWR New Proposal Issued

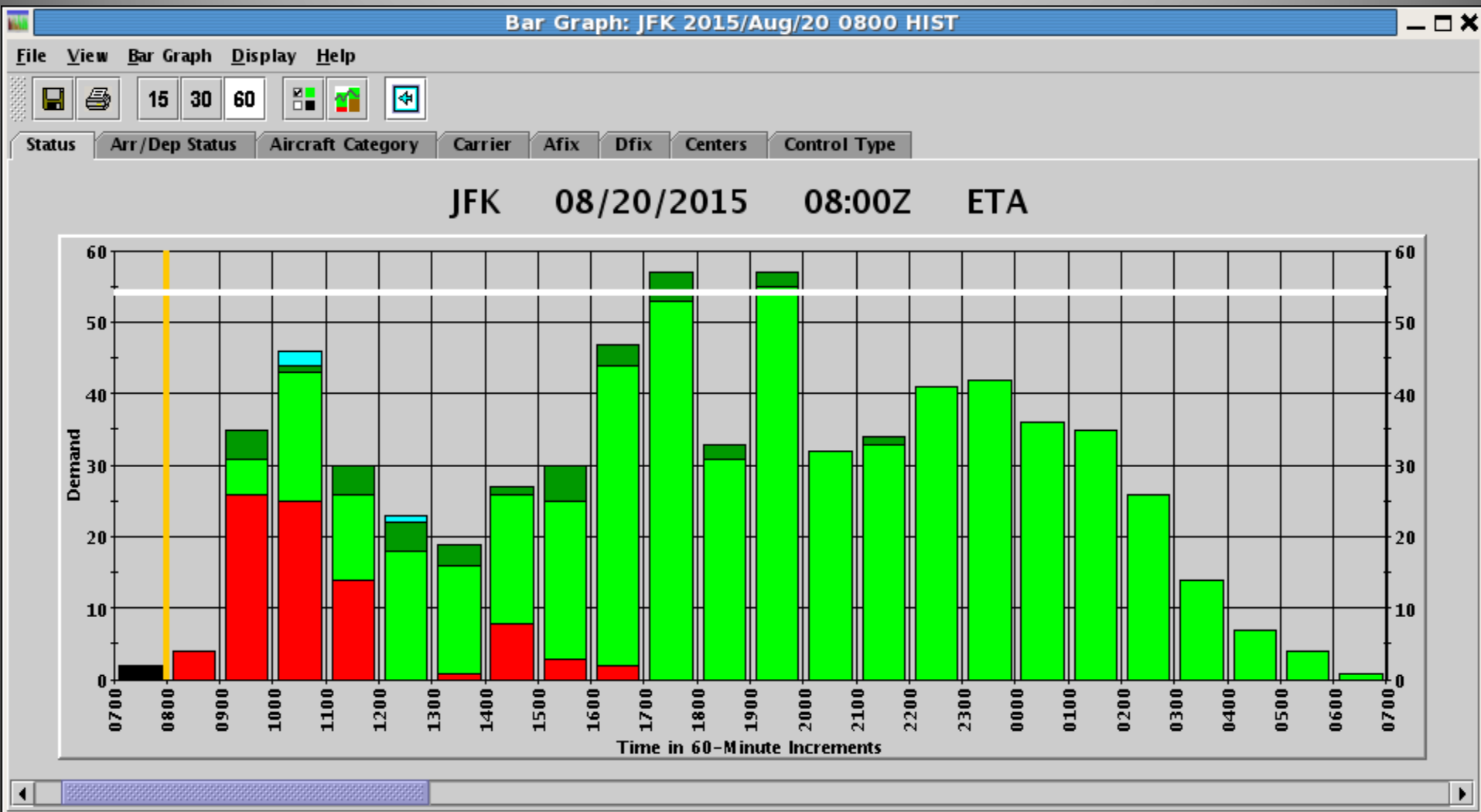
Cause: Revised Weather



EWR Final Demand and Cancellations

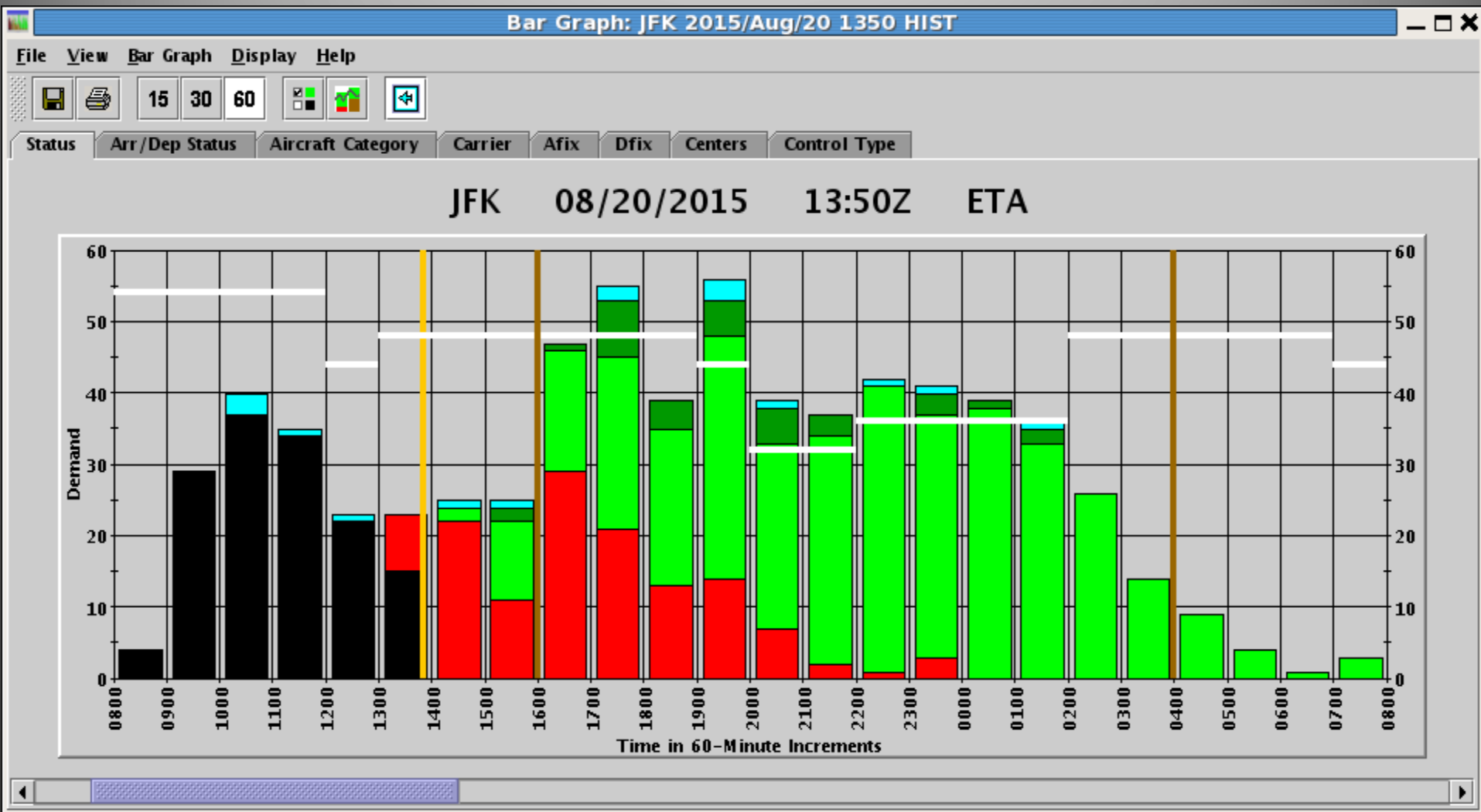


JFK Traffic Demand 8/20/2015



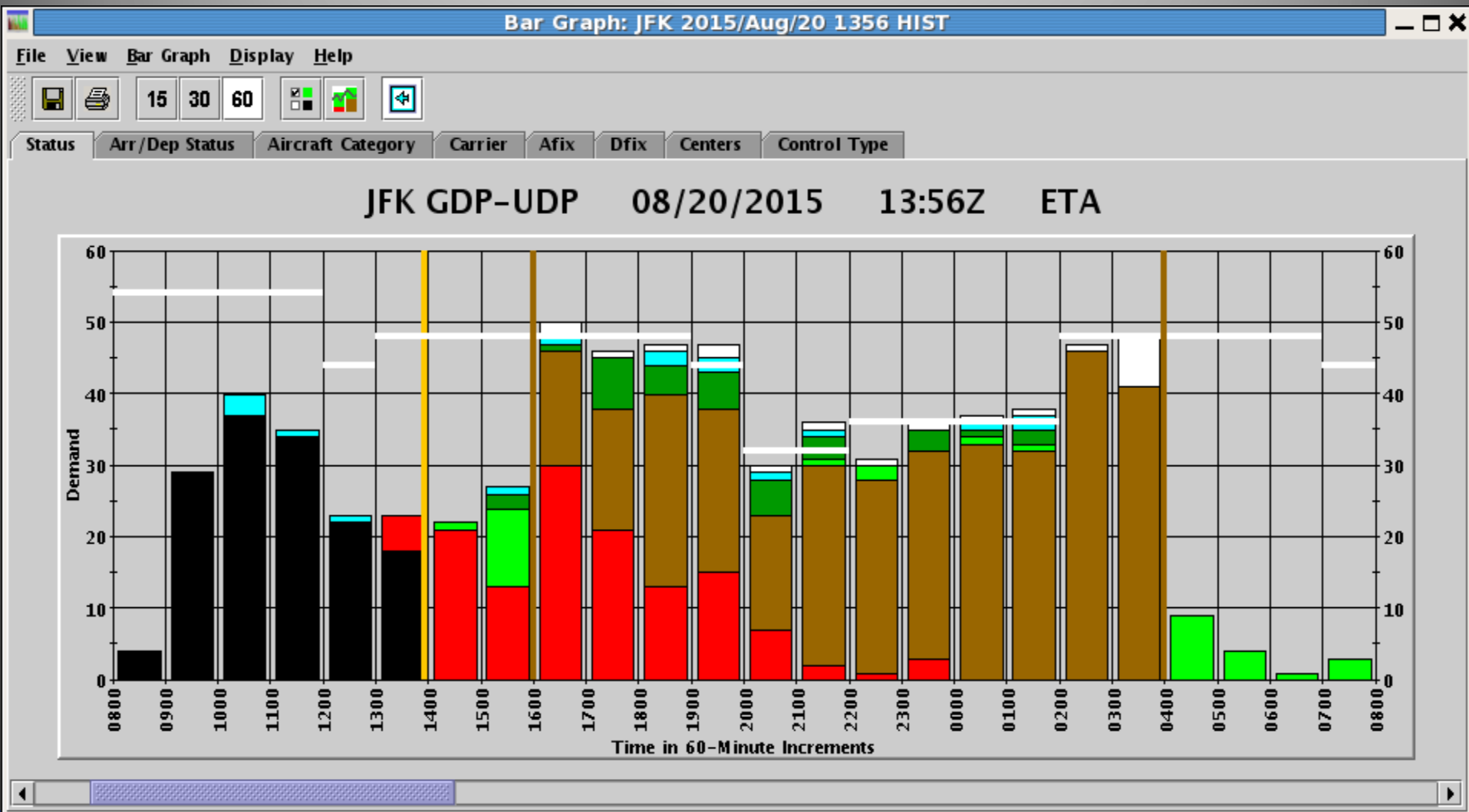
JFK Demand and Capacity

Proposal Issued



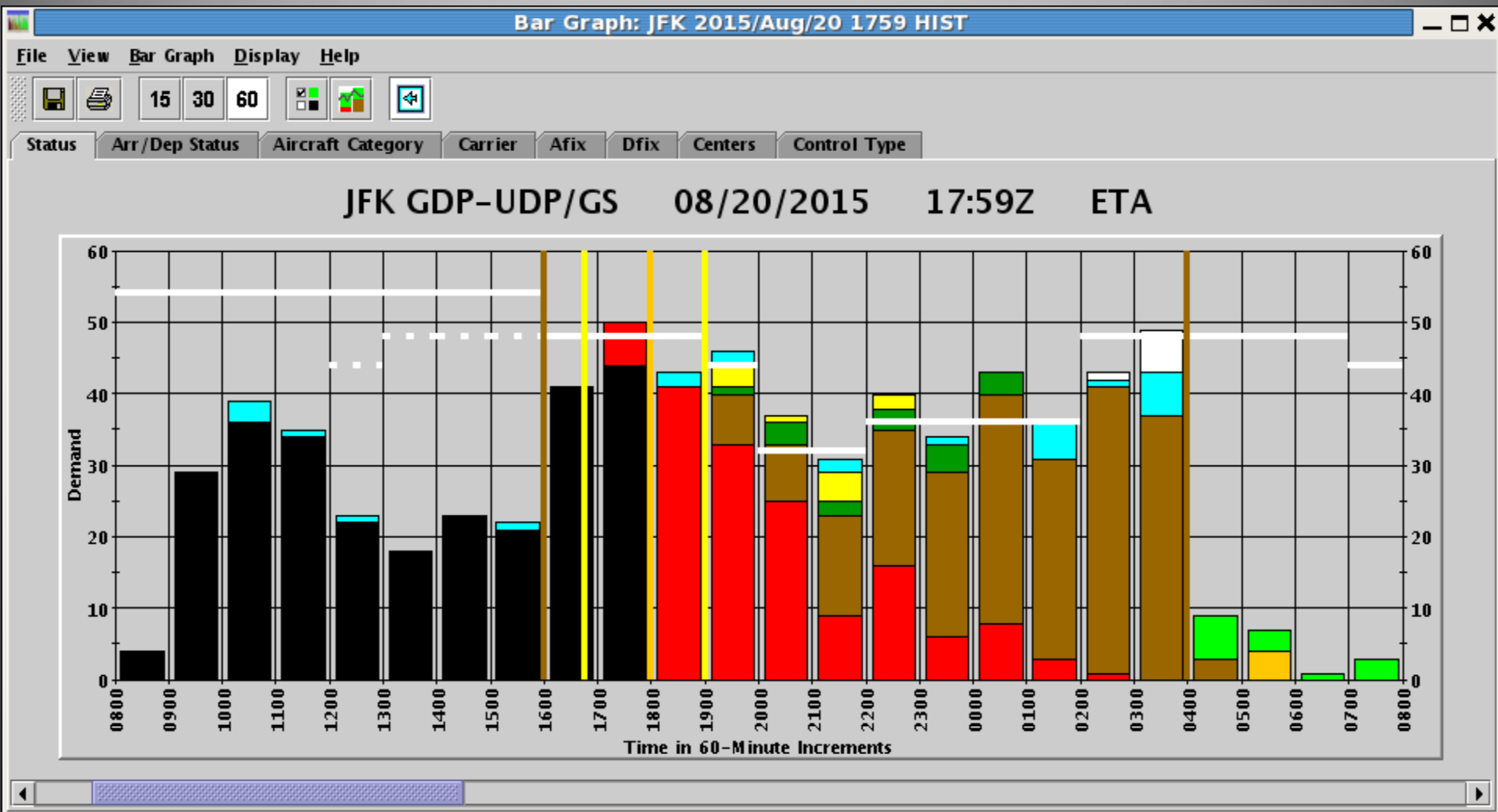
JFK Ground Delay Program

Cause: Weather/Thunderstorms



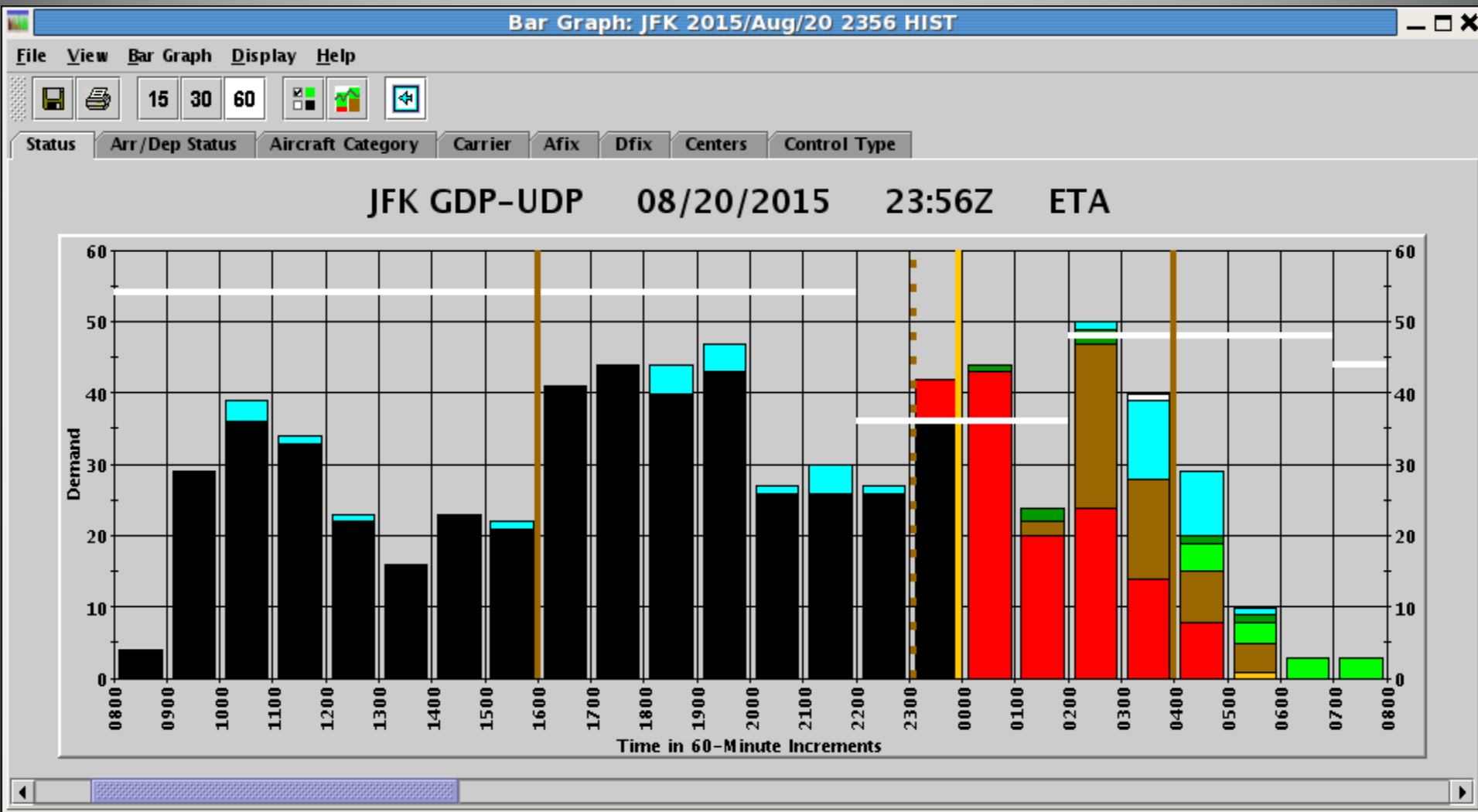
JFK Ground Stop

Cause: Over demand/Weather

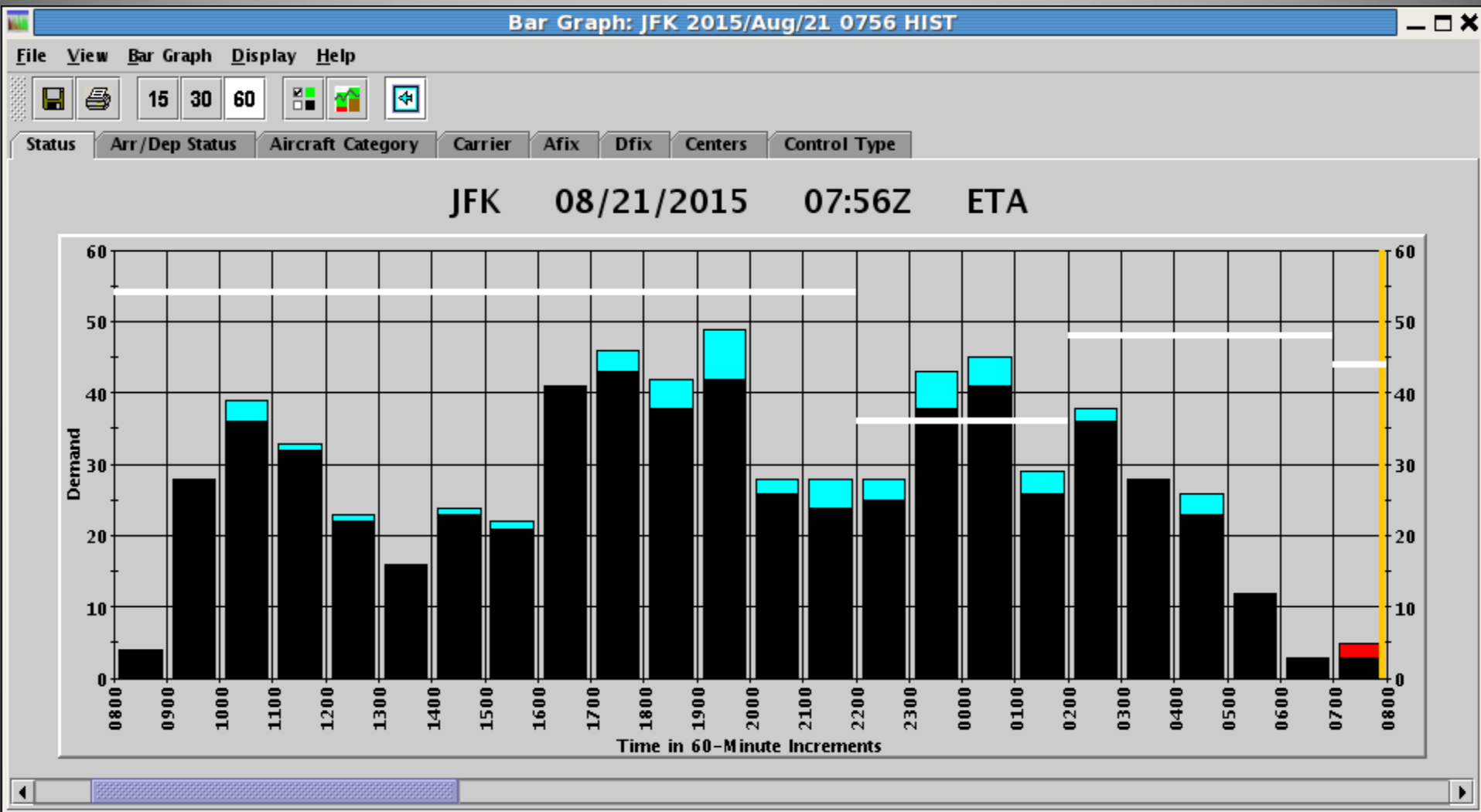


JFK New Proposal Issued

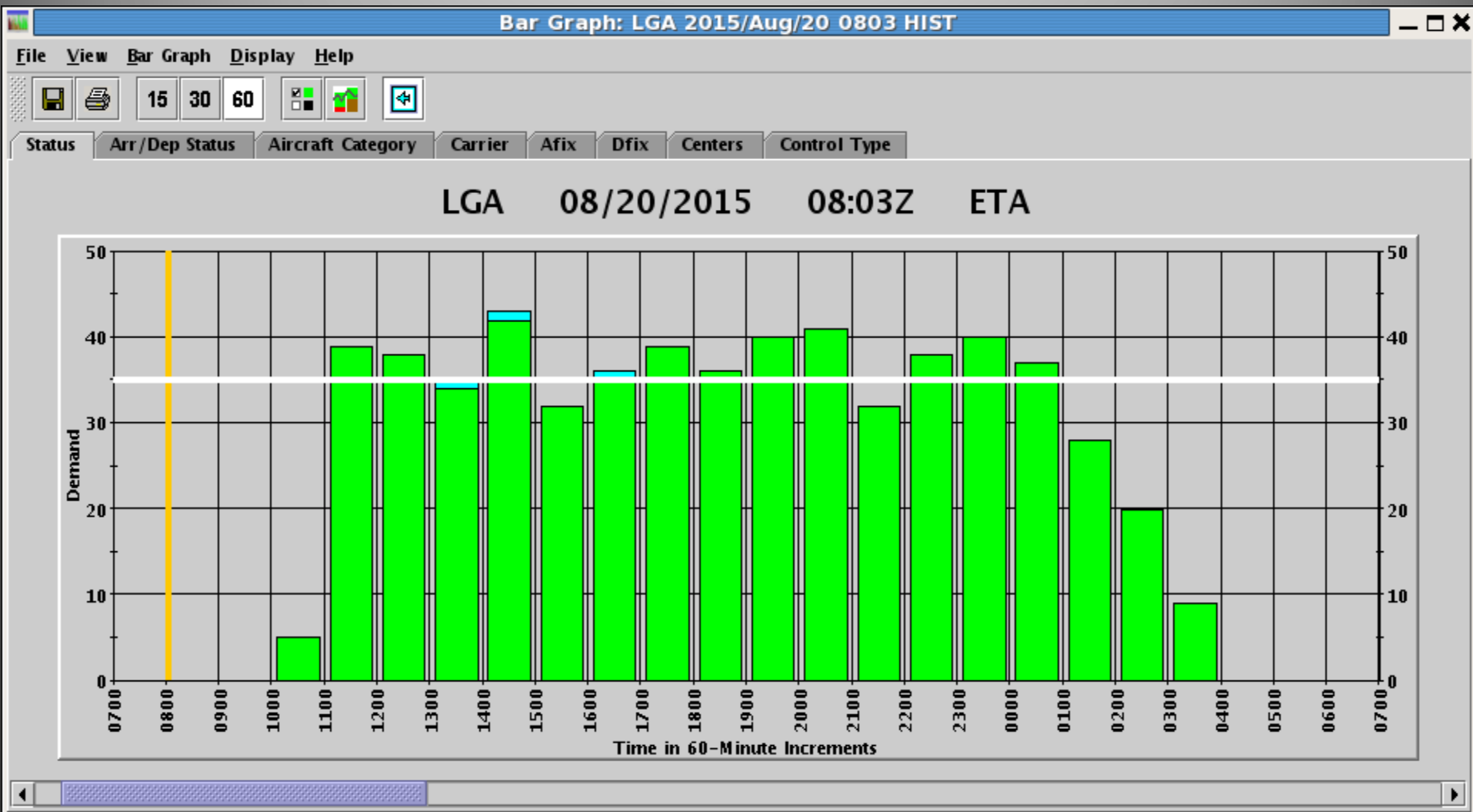
Cause: Revised Weather



JFK Final Demand and Cancellations

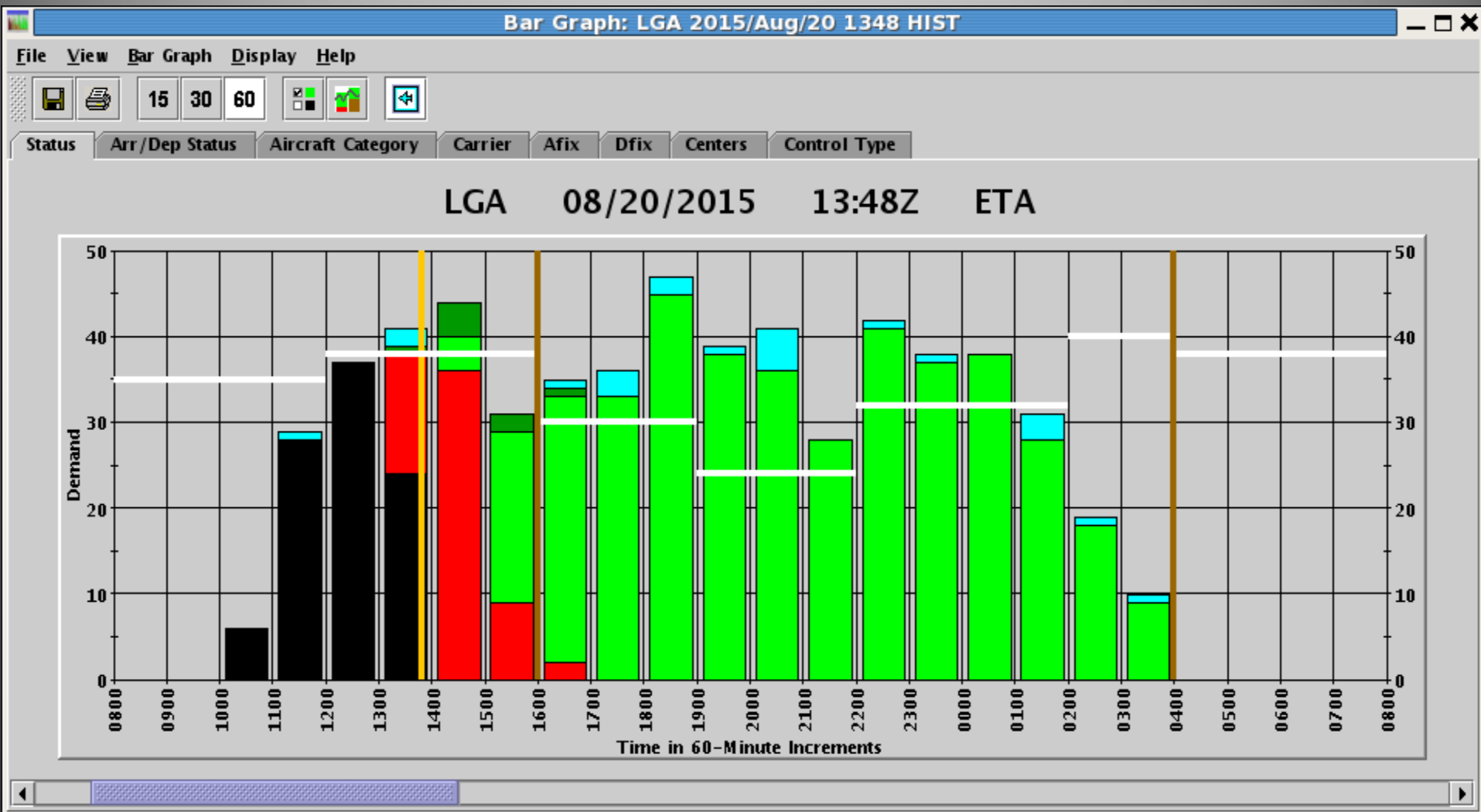


LGA Traffic Demand 8/20/15



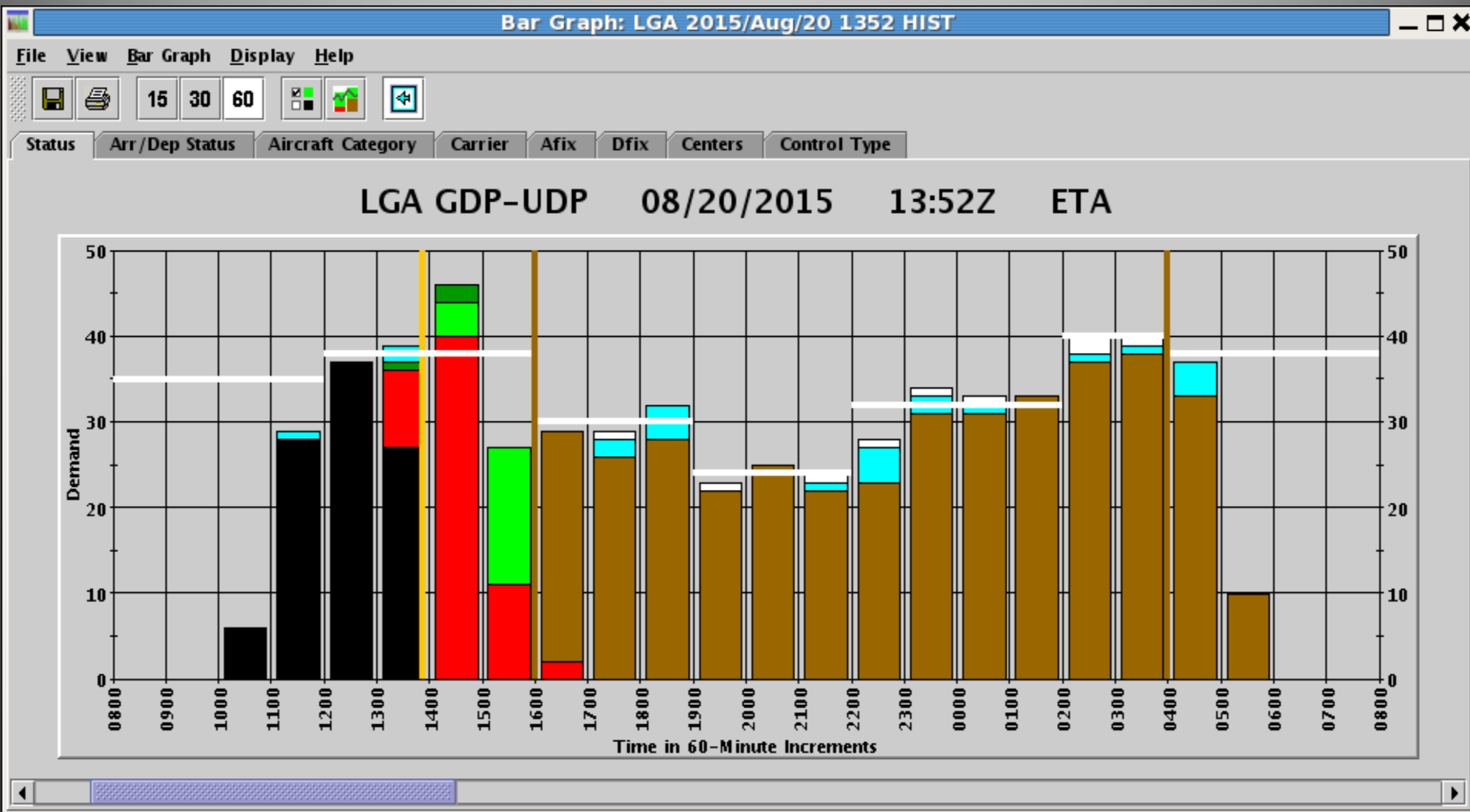
LGA Demand and Capacity

Proposal Issued



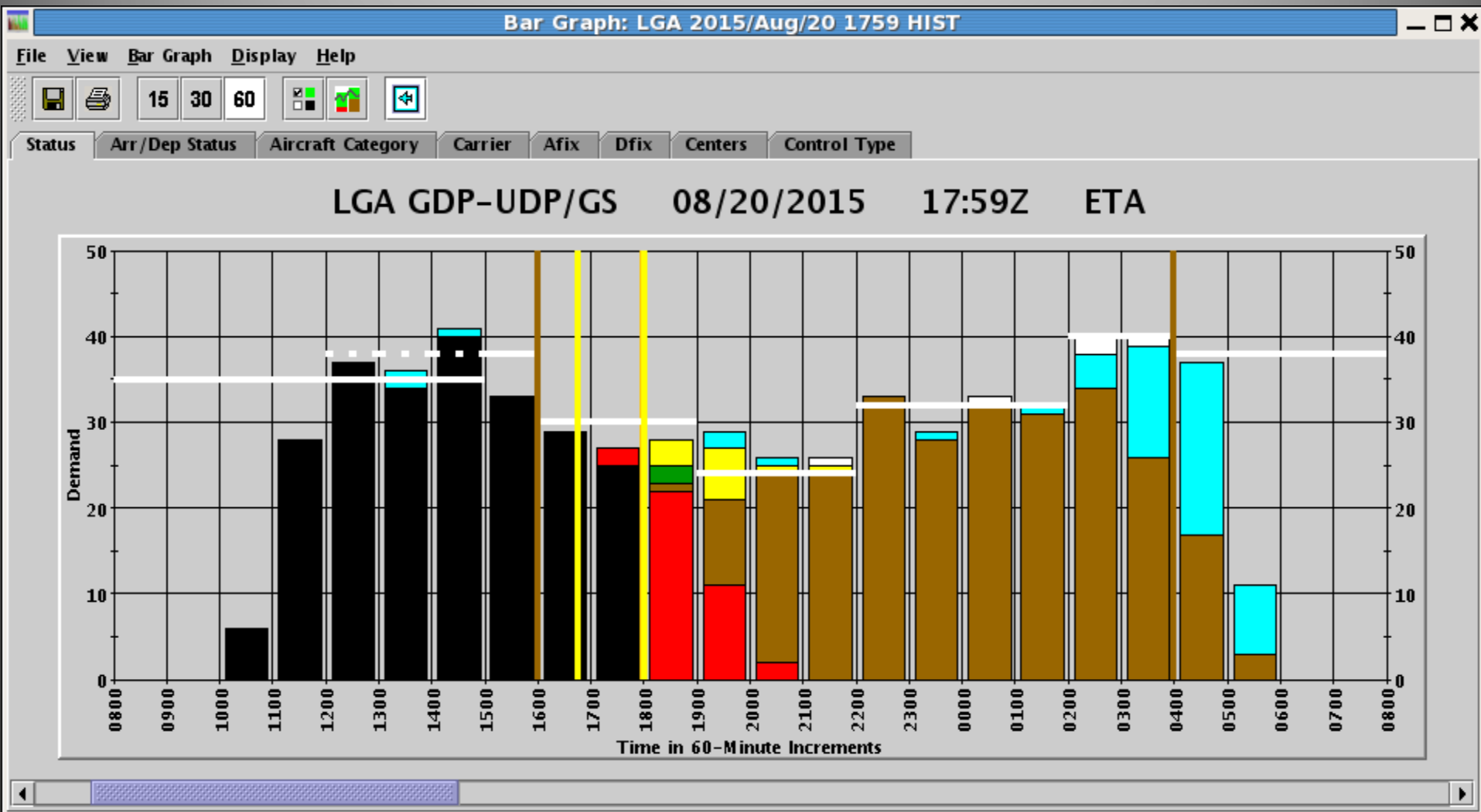
LGA Ground Delay Program

Cause: Weather/Thunderstorms



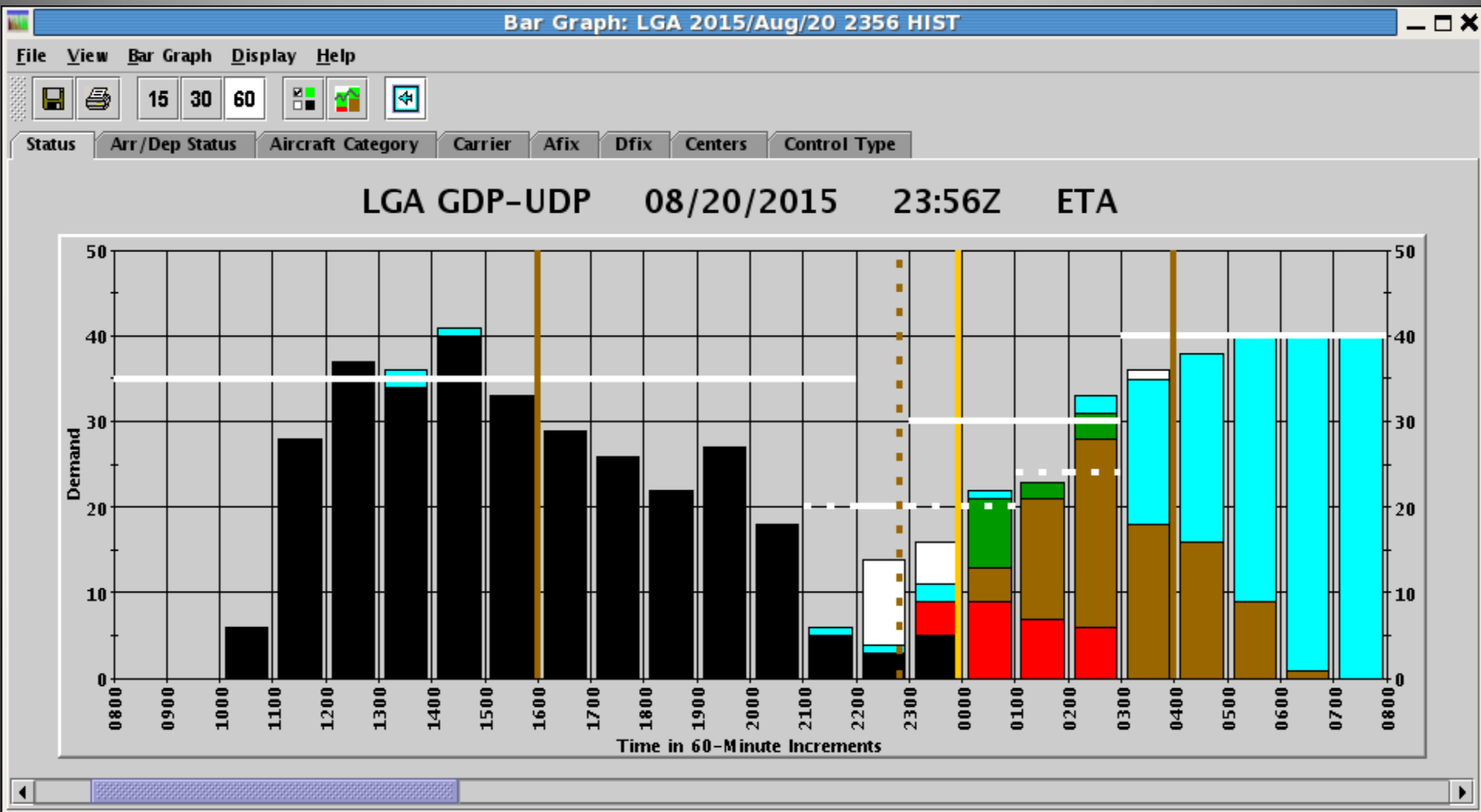
LGA Ground Stop

Cause: Over demand/Weather

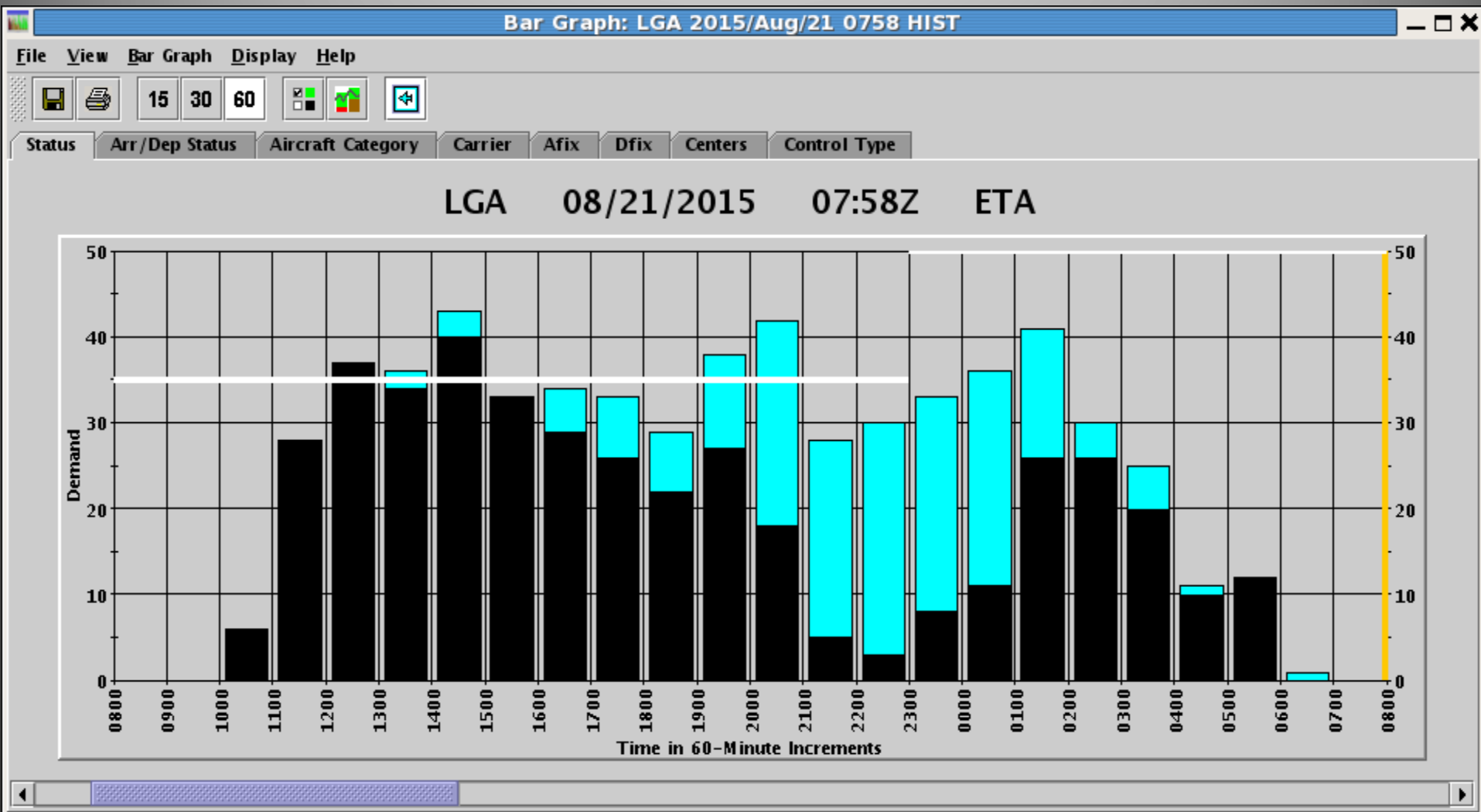


LGA New Proposal Issued

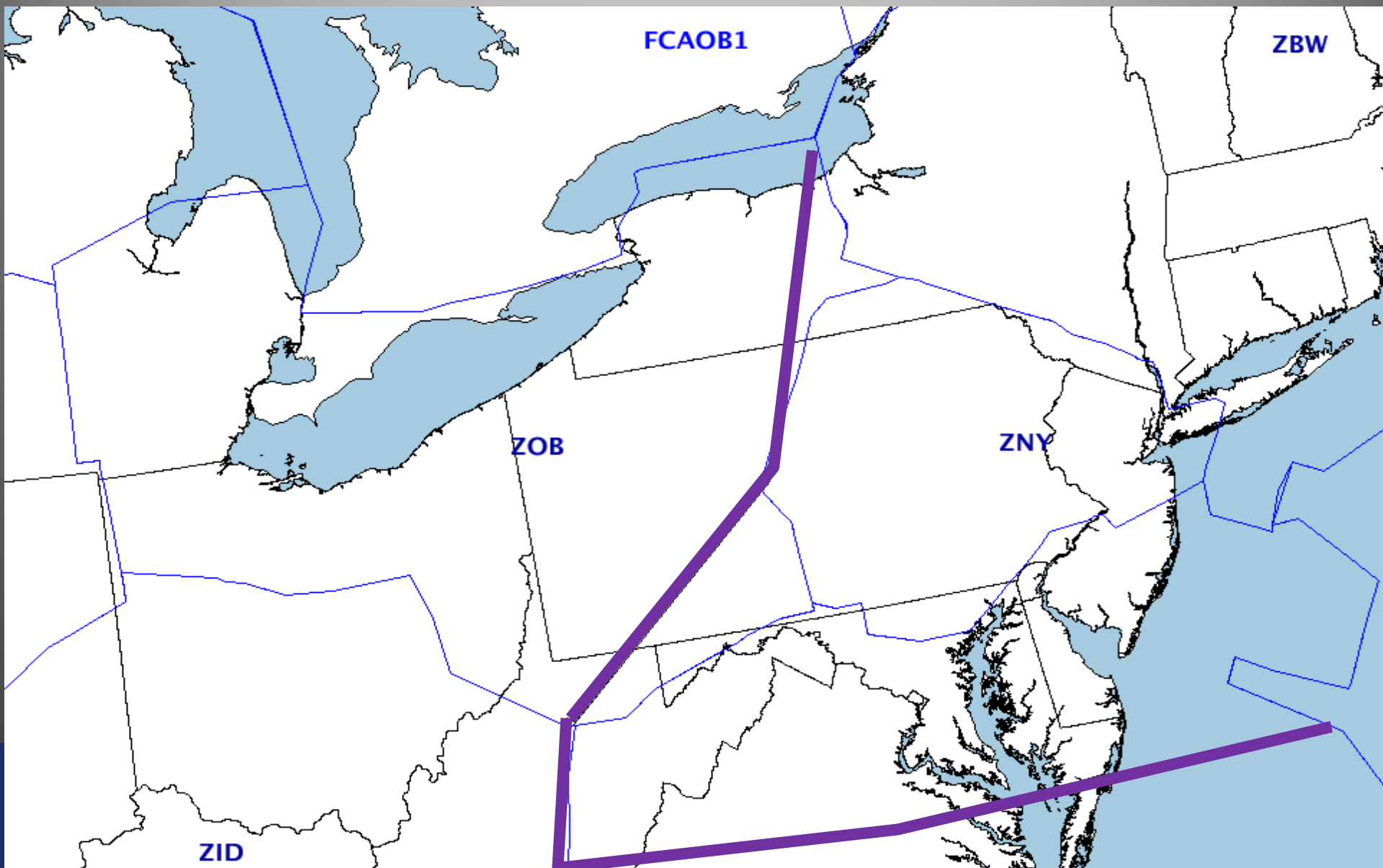
Cause: Revised Weather



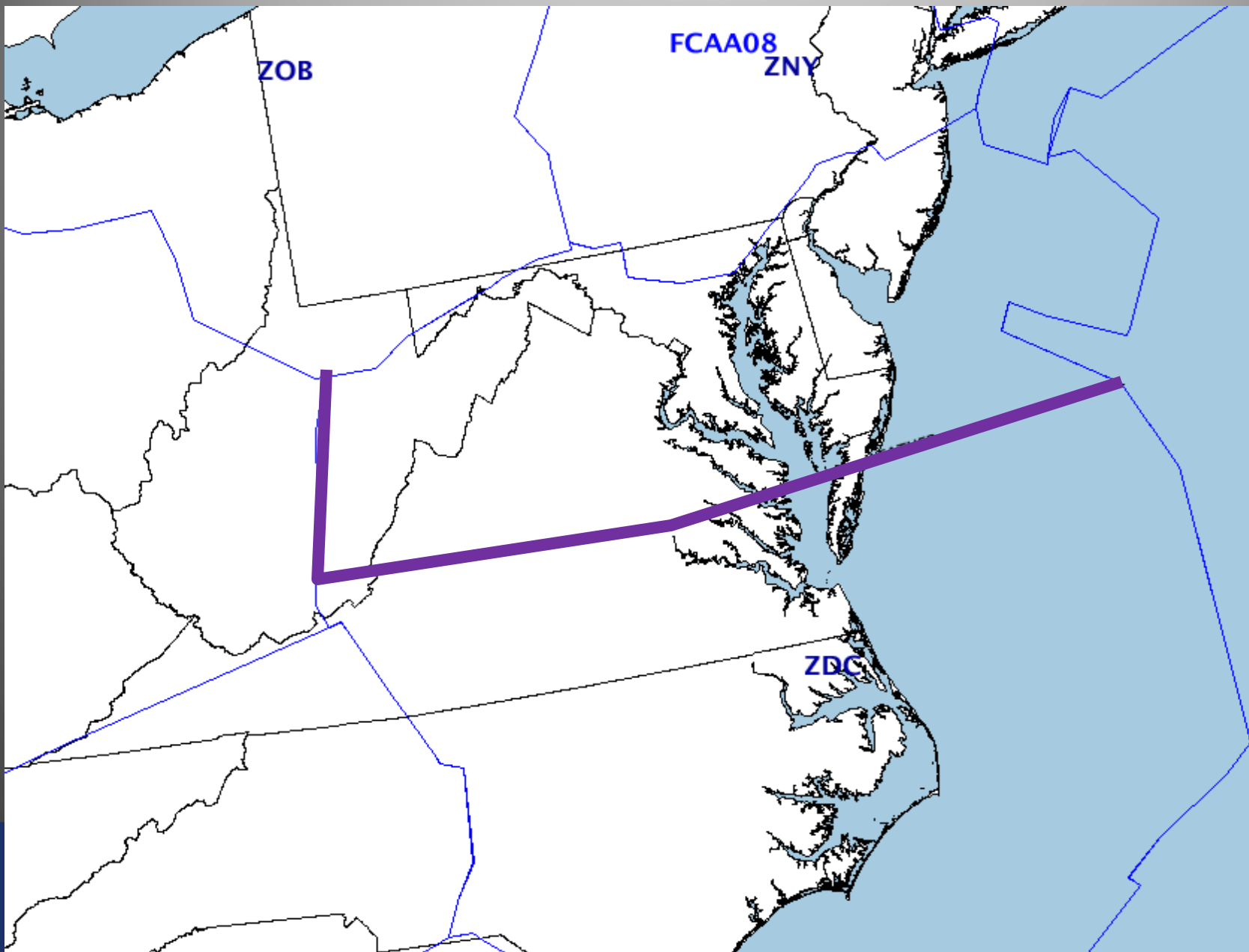
LGA Final Demand and Cancellations



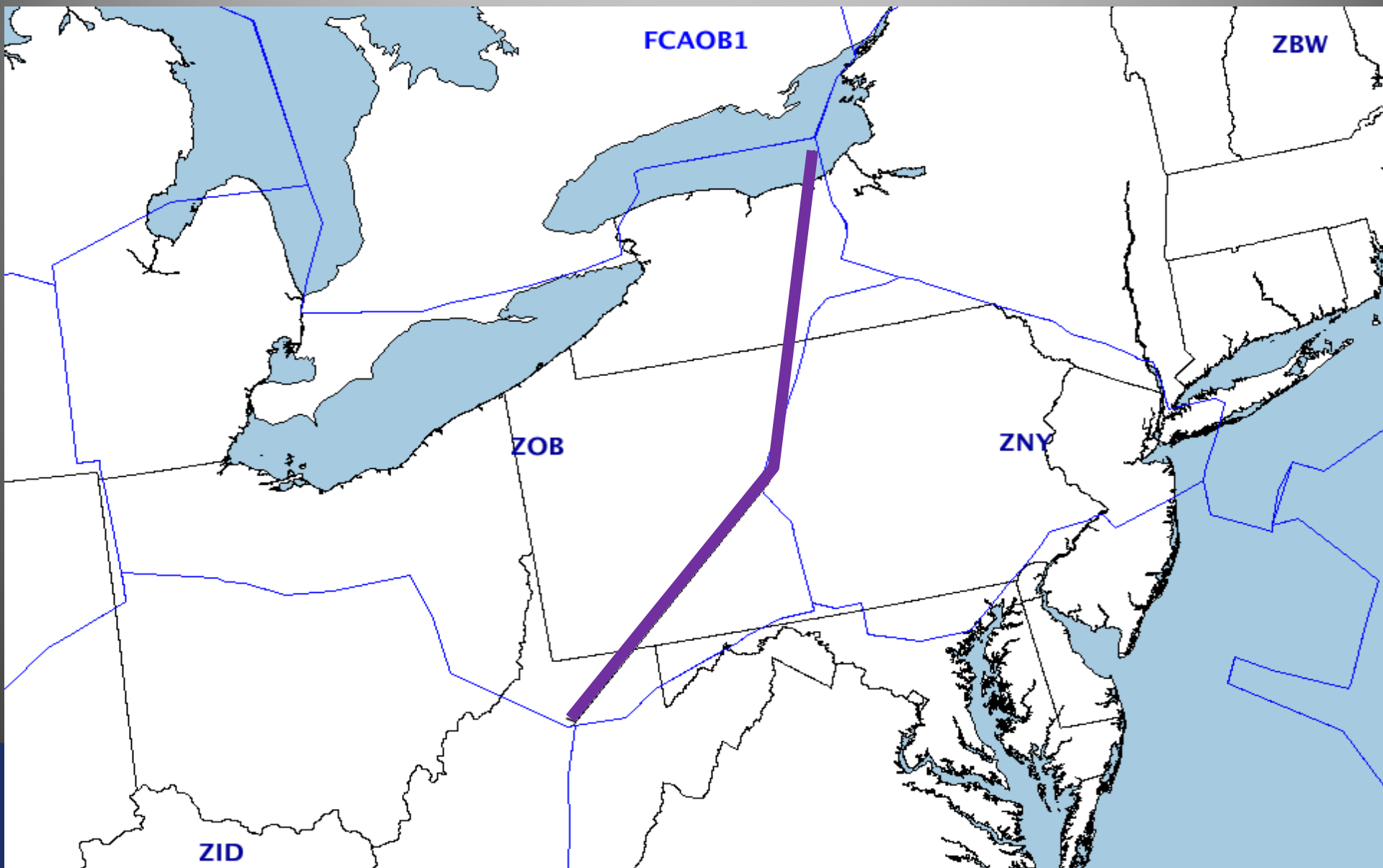
AFP FCAOB1 & FCAA08



AFP FCAA08



AFP FCAOB1



Customer Feedback

XYZ AIRLINE: NEW YORK METROS
SURROUNDED BY SIGNIFICANT AMOUNT OF
CONVECTION FOR MANY HOURS. THEY
TACTICALLY MOVED A LOT OF AIRPLANES,
USED LIMITED GROUND STOPS AND HAD A
GDP THAT SERVED THEM WELL. A VERY
GOOD JOB AND WE APPRECIATE HELPING
XYZ1234 DFW-LGA FROM DIVERTING.



Federal Aviation
Administration

Questions?





Muchas Gracias

Collaborative Decision Making



Federal Aviation
Administration