NAC Meeting

October 4, 2023

Opening of Meeting

Chip Childs, NAC Chair

President & CEO (SkyWest Airlines)

Public Meeting Announcement

NextGen Advisory Committee (NAC)

October 4, 2023

NAC Chair Report

Chip Childs, NAC Chair

President & CEO (SkyWest Airlines)

Motion for NAC Approval

- June 12, 2023 – NAC Meeting Summary Package Draft

Announcement

Andreas Boschen, Executive Director (SESAR 3 JU)

FAA Report

Katie Thomson, Deputy Administrator & NAC Designated Federal Officer (FAA)

Tim Arel, Chief Operating officer, Air Traffic Organization (FAA)

Paul Fontaine, Assistant Administrator for NextGen (FAA)

Jodi Baker, Deputy Associate Administrator, Aviation Safety (FAA)

NAC Subcommittee (SC) Chair Report

Warren Christie, NAC SC Chair (JetBlue Airways)

NAC Subcommittee Overview & Topics

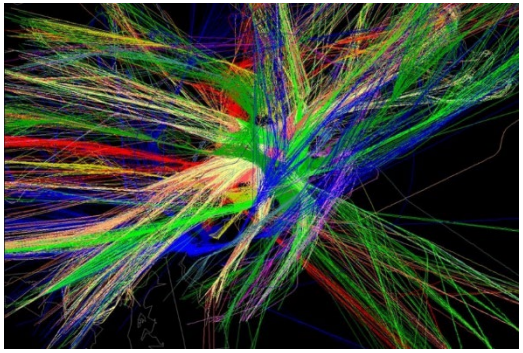
- Share interim findings from Task 23-1, Airspace Efficiencies

- Provide brief update on workgroup highlights, followed by policy level discussions facilitated by the NIWG Co-Chairs and FAA SMEs
  - Data Communications – En route data communication benefits
  - Surface & Data Sharing – Industry readiness for TFDM surface metering

- Status of the ADS-B In trials as follow-up to recommendations from Task 20-1, ADS-B In Commercial Application Technologies

Overview of Milestones (since June 2023 NAC)

Northeast Corridor

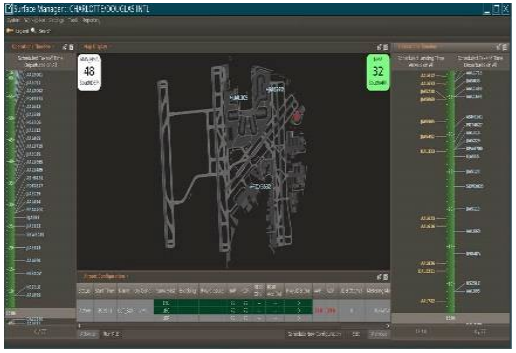


- Atlantic Coast Routes (ACR) in place since April
- PANYNJ moving forward with GBAS for JFK and LGA
- PANYNJ Fly Quiet Program draft scorecard developed

Data Communications

- Twelve en route centers operational with Full Services increment 1
- ZHU latest to go operational
- ZFW and ZJX planned for by the end of CY2023

Surface & Data Sharing



- Electronic Flight Strips operational at five sites
- Collaborative Site Implementation Team (CSIT) visits completed at six sites (where surface metering is planned)

NAC Tasking 23-1: NAS Airspace Efficiencies

Interim Findings

Lee Brown (JetBlue Airways) & **Ron Renk** (United Airlines)

Shawn Kozica (FAA), **Wendy O'Connor** (FAA), & **Greg Schwab** (FAA)

NAC Task 23-1: NAS Airspace Efficiencies

The FAA requests NAC advice on ways to achieve greater airspace efficiencies as we collaboratively attempt to reduce reliance on and divest from legacy systems and procedures and move to a reliance on a more modernized NAS.

The FAA offers the following suggestions as a way to begin the efficiency discussions:

1. Within the scope of current FAA automation capabilities, explore opportunities for increased utilization of existing Performance Based Navigation (PBN) procedures.
2. Identify opportunities for industry to leverage efficiencies gained from their avionics and dispatch systems investments while simultaneously allowing the FAA to divest from legacy NAS elements that do not contribute to those efficiencies.
3. Identify opportunities for the FAA to remove existing and infrequently used Instrument Flight Procedures (IFPs).
4. Identify opportunities to potentially modify existing IFPs/Standard Instrument Departure Procedures (SIDs)/Standard Terminal Arrival Procedures (STARs) to gain overall airspace efficiencies.
5. Identify a recommended baseline PBN and non-PBN IFP infrastructure to provide the minimum service level and airport access for both non-Global Positioning System/Area Navigation equipped aircraft and aircraft with advanced avionics for each Navigation Services Group Airport Category (1-5).
6. Identify any trends in IFP/SID/STAR inventory suggestions that might be used as a national standard.
7. Explore opportunities for even greater efficiencies with the use of Advanced Required Navigation Performance (A-RNP) as is being pursued by the Performance Based Operations Aviation Rulemaking Committee.
8. Work with the NAC Subcommittee Minimum Capabilities List (MCL) Team to capitalize on any cross-cutting issues that might support both taskings and industry achieving MCL-level of equipage.

Work Completed since June

- Process Completion
- Defining “Minimum Service Levels”
- FLL Case Study
- Better Use of NextGen Procedures

Process Completion

- **As briefed in June, the group worked on a way to take *objective* FAA procedure use data and add a *subjective* review.**

- **This requires a review of things such as: types of operations at the airport, contingency procedures, weather patterns, airspace constraints, runway configuration, etc.**

- **Since June, the FAA met with regional and local Air Traffic personnel and no additional changes were requested for this process.**

- **The process was used for the initial case study (FLL) with success.**
  - Will review later in this presentation when we talk about FLL

Defining Minimum Service Levels

- **To assist the FAA's review of an airport, we defined Minimum Service Levels based on airport Navigation Service Group (NSG) as defined in the FAA PBN Roadmap.**

NSG 1 - Low visibility (<200' HAT), redundancy (spaced-based/ground-based, DEP/ARR runway), arrivals, departures

NSG 2 - Low visibility (<=200' HAT), redundancy (spaced-based/ground-based, DEP/ARR runway), arrivals, departures

NSG 3 - CAT I mins, redundancy (spaced-based/ground-based, DEP/ARR runway), arrivals/departures where needed

NSG 4 - Instrument approaches to ensure runway access, procedures to meet operational needs of primary airport users.

NSG 5 - Instrument approaches (where users equipped) to ensure runway access, procedures to meet operational needs of primary airport users. Consideration for equipage should given to ensure any approaches available are useable by airport users.

Defining Minimum Service Levels (cont.)

- **The group was also able to make some blanket statements about retiring certain approach types.**
  - ILS, keep when: it's the only vertically guided approach, ceiling and visibility (minima) reduced compared to PBN, resiliency for GPS failure, pilot training required.
  - RNP AR, keep when: curved approach required, NextGen program in use (example: Established on RNP), ceiling and visibility (minima) reduced compared to GPS, allows for airport access.
  - PRM Approaches: Thanks to 7110.308, PRM approach use greatly reduced. FAA should look at the need for separately titled approach if cost savings can be achieved.

FLL Case Study

- **Approaches:**
  - Did not find wastefulness with approaches. Due to runway use and need for resiliency (runway closures), right balance of ILS and PBN.
  - Industry willing to do without LOC approaches with the idea that when the full ILS is out, RNAV should be used in its place.

- **Departures/Arrivals:**
  - Some low use departures/arrivals needed for satellite airports, contingency and to mix prop/turbojet traffic.
  - Willingness however to look at combining up some procedures to reduce overall inventory.

Better Use of NextGen Procedures

- **The group started discussion on how to get better use of NextGen procedures where it occurred organically in other discussions. Some concepts included:**
  - Making use more attractive by providing better benefits for ATC and operators.
  - Better name and education of existing controller tools that support PBN operations, like Converging Runway Display Aid (CRDA). Calling it something like Converging Aircraft Display Aid (CADA) would draw attention to it being used for other than converging runways. During FLL discussions, ATC didn't realize that tool could be used to assist sequencing curved approaches with straight-in approaches.
  - Procedure design that helps support use: In FLL example, controllers said connecting RNPs to arrivals would assist in making them more usable.
- **More robust discussions will occur around this topic later this fall.**

What's Next

- Additional Case Studies (Different NSG groups, NY)
- Explore opportunities for increased utilization of existing Performance Based Navigation (PBN) procedures.
- Opportunities to modify existing IFPs/Standard Instrument Departure Procedures (SIDs)/Standard Terminal Arrival Procedures (STARs) to gain overall airspace efficiencies
- Opportunities for efficiencies with the use of Advanced Required Navigation Performance
- Work with the NAC Subcommittee Minimum Capabilities List (MCL) Team to capitalize on any cross-cutting issues that might support both tasks and industry achieving MCL-level of equipage

En Route Data Comm

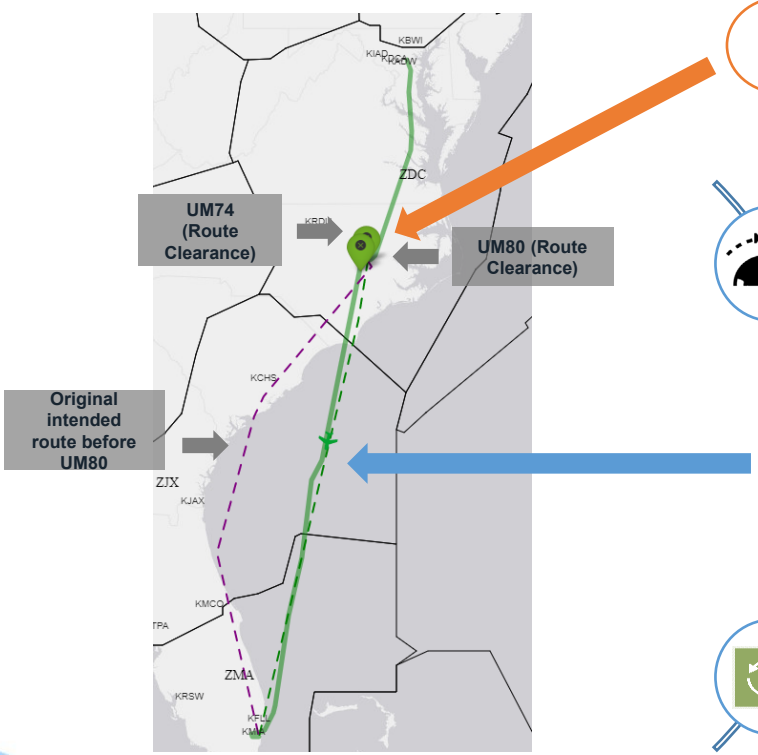
Chris Collings (L3Harris) & **Ed Evans** (Southwest Airlines)

Kathy Torrence (FAA)

Data Comm benefits example – Washington Center (ZDC)

ZDC was extremely busy supporting several Traffic Management Initiatives:

- 3 AFPs (Air Flow Programs) for ZJX and ZMA for thunderstorms on the inland routes
- PHL VIP TFR (Temporary Flight Restrictions)
- Miles in Trail Restrictions to NY Metro Airports and FL KMIA/KFLL/KPBI and KMCO
- Three southbound flights all received a similar re-route in ZDC to avoid weather



129 seconds of communications time saved

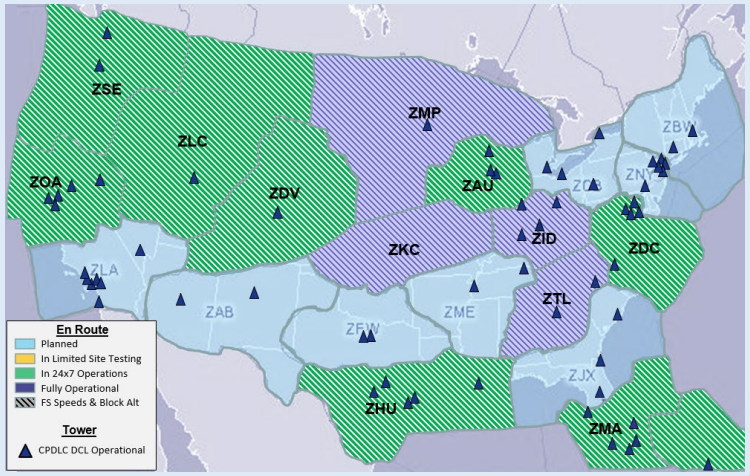
Cumulative estimated savings across 3 flights

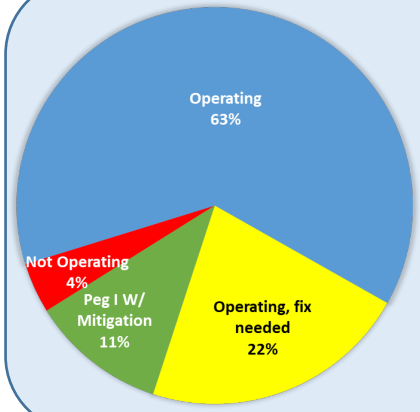
- 39 nm of distance saved
- 6.2 minutes of time saved
- 987kg of CO_2 emissions avoided
- 313kg of fuel saved

Data Comm NIWG Update (October 2023)

En Route Data Comm Deployment

+ 12 centers operational 24/7
+ En Route Full Services Increment 1 active at all active centers
+ Planning next En Route deployments to ZFW (Q4 2023), ZJX (Q4 2023), ZOB (Q1 2024), ZNY (Q2 2024)





Industry & Avionics Performance Updates

+ Business aviation users resumed en route participation – closely monitoring performance
+ Continue to receive positive user feedback as usage grows
+ Confirmed plan for A220 avionics updates – Q4 2024
– NIWG members expressed concern about the “Enhanced Services” baseline slipping to end of 2029

Data Comm En Route by the numbers

March 2019 – July 2023

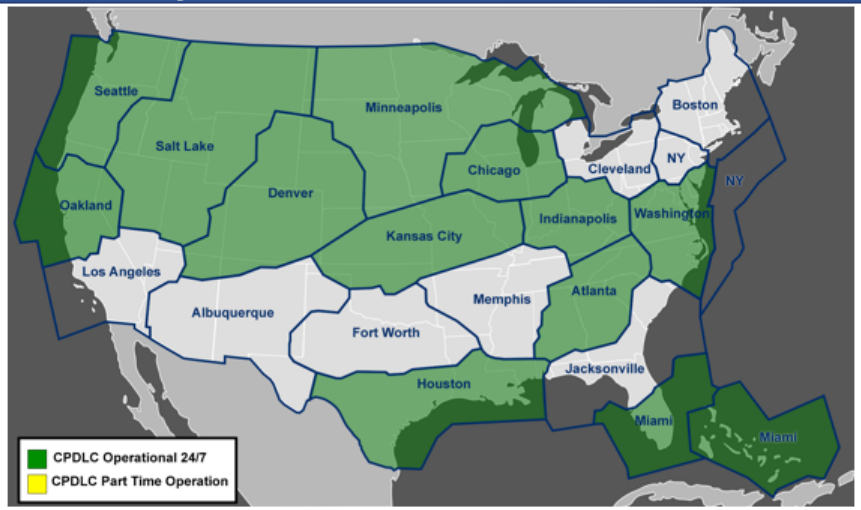
32,563,378 transactions

4,917,283 sessions

26 commercial aircraft types

34 commercial operators

Over 4,400 equipped aircraft



704,970 readback errors mitigated

2,664,371 minutes of comm time saved

10-Minute Break

NAC Subcommittee (SC) Chair Report

Warren Christie, NAC SC Chair (JetBlue Airways)

Terminal Flight Data Manager
Industry Readiness

Rob Goldman (Delta Air Lines) & **Chris Oswald** (ACI-NA)

Doug Swol (FAA)

To Realize Benefits of TFDM… What is Needed of Industry?

- **Engage Collaborative Site Implementation Team (CSIT)**
  - Surface data management differs at key hub airports
  - Procedures, policies, plans with local surface working group
  - **FAA feedback:** Strong engagement from industry at all CSIT events

- **On ramp to TFDM/TFMS System Wide Information Management (SWIM) services**
  - Provide key surface data elements to FAA via SWIM like Earliest Off Block Time and Departure Gates
    - **FAA feedback**: FAA receives data for five major carriers
  - Use TFDM and SWIM testbeds
    - **FAA feedback**: FAA working with one carrier/partner to onramp
  - Develop infrastructure/surface management tools to utilize TFDM data
    - COTS or local IT solutions

Does industry have IT investment plans to become TFDM ready?

FAA Industry Readiness Assessment

TFDM is coming to a Hub Near You!

Airport	IOC Date	Readiness Level
CLT	3/2024	Medium
PHX	12/2024	Very Low
LAS	2/2025	Very Low
SEA	3/2025	Low
LAX	4/2025	Low
SFO	5/2025	Low
IAH	6/2025	Low
MDW	7/2025	Very Low
MIA	10/2025	Low
BOS	3/2026	Very Low
ATL	4/2026	Low
SLC	7/2026	Low
SAN	8/2026	Very Low
DEN	9/2026	Low
DFW	10/2026	Low

Complete waterfall in Read-Ahead

Readiness Level Legend

High	Sufficient Surface Data, Accurate Surface Data, SWIM Onramping Complete Surface Tools Ready
Medium	Sufficient Surface Data > 80%, Accurate Surface Data, SWIM Onramping In Progress Surface Tools In Progress
Low	Limited Surface Data >60%, Inaccurate Surface Data, SWIM Onramping Not Started Surface Tools Not Ready / In Progress
Very Low	Insufficient Surface Data SWIM Onramping Not Started Surface Tools Not Ready

Assessments based on FAA SWIM data analysis, CSIT discussions and surveys

Industry Supports TFDM Capabilities

- **TFDM is an integral part of a suite of tools that optimizes traffic flow management (TFM) and enables trajectory based operations (TBO)**
  - TFDM reconciles data from other systems such as Traffic Flow Management System (TFMS) and Time based flow management (TBFM) and establishes release times that aid in surface management
  - Data exchange with TFDM enables continuity between the airport environment and en route airspace
  - Reduced taxi time equates to reduced fuel consumption and CO2 emissions
  - Reduced surface complexity increases situational awareness and safety

Airport Operators will Also Benefit, But Clarity on Supporting Investments and Investment Timing is Needed

- **TFDM will Benefit Airport Operators**
  - Improved utilization of airfield and terminal infrastructure
  - Improved operational efficiency
  - Increased collaboration with ATO and flight operators
  - Reduced carbon emissions and possibly taxi-out noise exposure
  - Enhanced situational awareness and airside safety

- **Clarity Needed Regarding Airport Investments Needed to Obtain Benefits**
  - Collection of key operational data for non-CDM carriers (earliest off block times, gate assignments, airside constraints)
  - Surface management capabilities that can interact through FAA's Systemwide Information Management System (SWIM) to feed TFDM in real time
  - Particularly critical for Configuration A sites, where departure metering will occur

NAC Task 20-1 Recommendation Update:
ADS-B In Operational Trial

David Surridge (American Airlines)

NAC Tasking 20-1

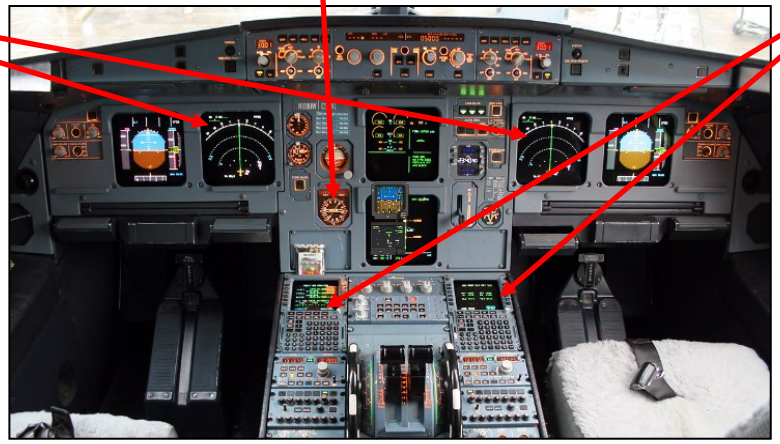
- **Asked for industry interest in ADS B In applications**
  - Industry overwhelming expressed interest in ADS B In technology
  - Industry willingness to invest is dependent on FAA infrastructure investments
  - Tasking included a periodic briefing on data gathered from trial

Cockpit Display of Traffic Information (CDTI)

Navigation Display

ADS-B In
Guidance Display
(AGD)

Multi-Purpose Control
Display Unit



Current State

- **Air travel continues to grow along with population**
  - Air travel provides needed services
  - Safest and most efficient form of transportation

- **Constraints to airspace continue to grow**
  - Delay is a constant problem affecting traveling public satisfaction
  - Limit to future NAS expansion
  - Causes inefficiencies and increase in CO2 emissions

- **Airports**
  - New runways are hard to impossible to add

- **TBO could help but might hurt**
  - Will need specific accurate spacing tools to work
  - ADS B investments allow for markedly improve spacing

Purpose of the Trial

- **Leverage existing investments in ADS B Out mandate**
- **ADS B In**
  - Allows for internal algorithms to use exact environmental information to produce high fidelity spacing
    - Inter Aircraft Timing is unmatched by other spacing tools
- **Evaluate 25 years of research and funding for ADS B In applications**
  - Interval Management (IM)
  - CDTI Assisted Approaches (CAS)
  - In Trail Procedures (ITP)
  - And other Applications
- **Collect data and then more data**

Data Collection

Multiple Sources

Swim data to include

- PDARS
- ADSB

Internal Data Sources gathered through the TCAS LRU

- 100 parameters examined to verify system functionality and pilot inputs

American internal data

Feedback Forms and APA follow up conversations

Data is carefully analyzed to get the most accurate picture

Monthly meeting to analyze data with ZAB/ D-10, AA, ACSS, and FAA

Honest conversations of the operation and what works and what doesn't

CDTI Assisted Visual Separation (CAVS)

- Started using CAVS immediately upon equipping aircraft
- Crews reported back that the increase in situational awareness resulted in avoiding go-arounds
- Data supports more efficient spacing on final due to increased flight information from following traffic

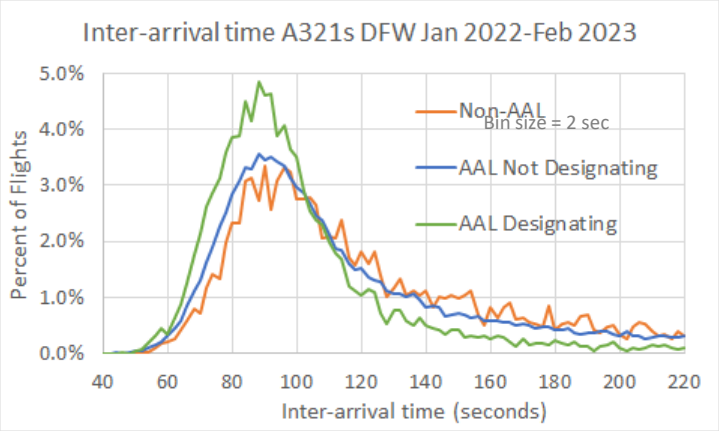
IAT for A321s into DFW Jan 2022-Feb 2023

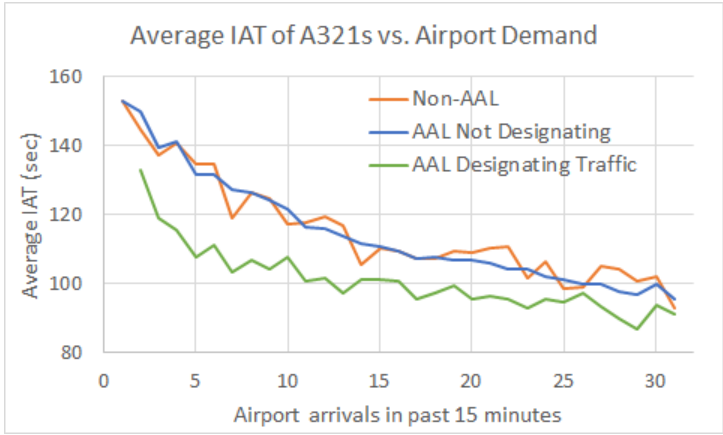
- **Metric**
  - Inter-arrival Time (Time between ownship threshold time and previous arrival threshold time on same runway), IAT
- **Analysis Details**
  - Limited analysis to A321 and A21Ns into DFW January 2022 – February 2023 (14 months)
  - Removed arrivals with IATs > 220 sec or < 40 sec, arrivals behind a heavy, arrivals during IMC (<1000 feet ceiling OR <3 miles visibility)
  - Examined distribution of IAT comparing non-AAL A321s, AAL A321s (those Designating Traffic and those not)
  - Also examined impact on IAT using regression on A321s
- **Results**
  - Average IAT smaller by 13-20 seconds for aircraft Designating Traffic

A321 and A21N	Non-AAL	AAL (not Designating)	AAL Designating Traffic
Mean IAT (sec)	118	111	98
Median IAT	107	101	92
Stdev IAT	37	36	27
Observations	4,159	46,707	5,287

Regression Results

Predictors of IAT	Coefficient (seconds)	P-Value
Baseline IAT (constant)	135	<< 0.05
Arrivals in past 15 min airport	-1.4	<< 0.05
Behind a Heavy	44.0	<< 0.05
AAL	-1.6	0.003
AAL Designating Traffic	-11.1	<< 0.05



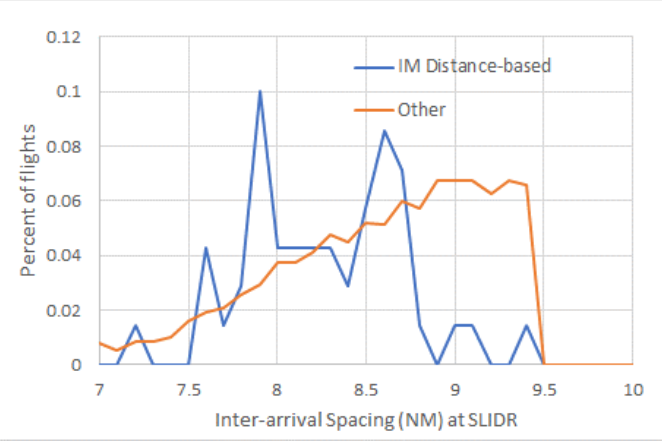


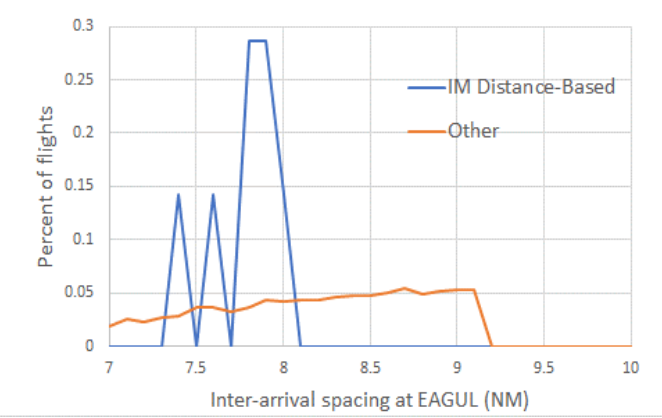
Interval Management (IM) – ZAB

Trial began November 2022

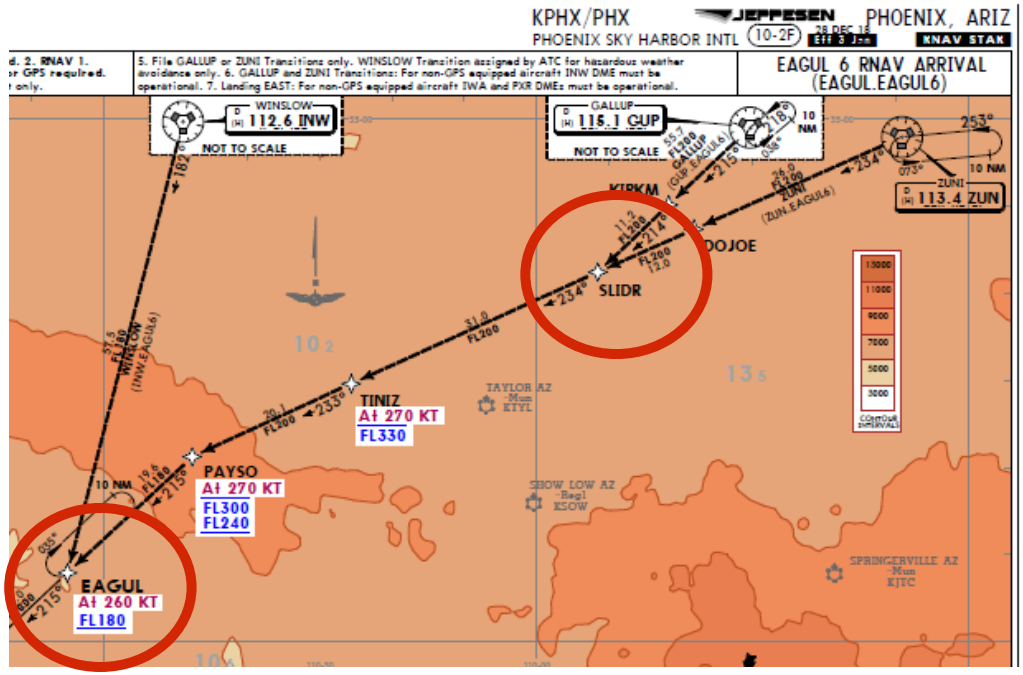
- Started off well with enthusiasm from the work force
- Start up issues occurred
  - Aircraft database was incomplete
  - Learning curve on how to use the technology
  - Algorithm understanding for controller and pilot alike
  - Human/machine improvements needed
- Data shows IM can provide spacing enhancements
  - Operation provides predictable, repeatable performance
  - Controllers embrace the technology with ERAM automation
  - Pilots see the benefits of added situational awareness

IM DATA



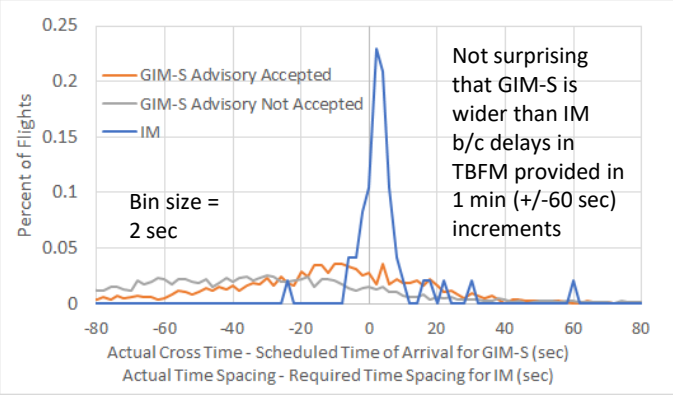


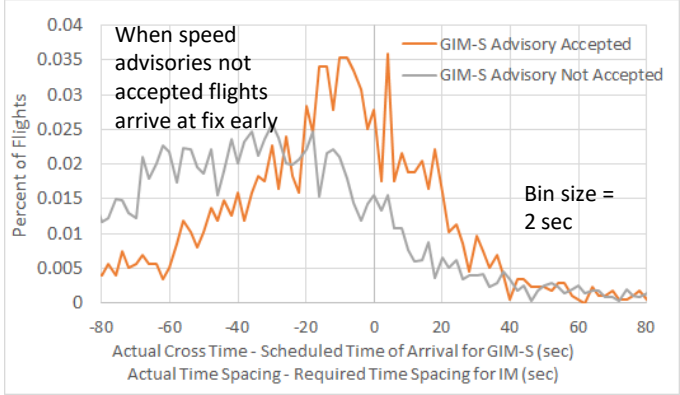
- AT SLIDR *Cross and Maintain* 8 NM behind……
- AT EAGUL *Cross and Maintain* 8 NM behind……



I-IM: Delivery Accuracy I-IM at ABP vs. GIM-S at XMP

- **Examined Actual Time Spacing – Required Time Spacing at Achieve By Point (ABP) for flights using IM avionics and indication of controller interaction**
  - See previous page
- **Examined Actual Cross Time – Scheduled Cross Time at Extended Meter Point (XMP) for flights that accepted speed advisories and had non-zero TBFM delay**
  - PHX arrivals that accepted speed advisories for ZABX1, ZDVPHXX, ALIBYX1
  - Jan 2022 - June 2023 data from online TBFM Tableau data set





		Actual Time Spacing – Required Time Spacing (sec)		Actual Cross Time – Scheduled Time of Arrival (ATA-STA)	
Operation	Observations	Average	StdDev	Average	StdDev
IM (Time-based)	61	4	11		
GIM-S	7017			-10	41

CDTI Assisted Separation (CAS)

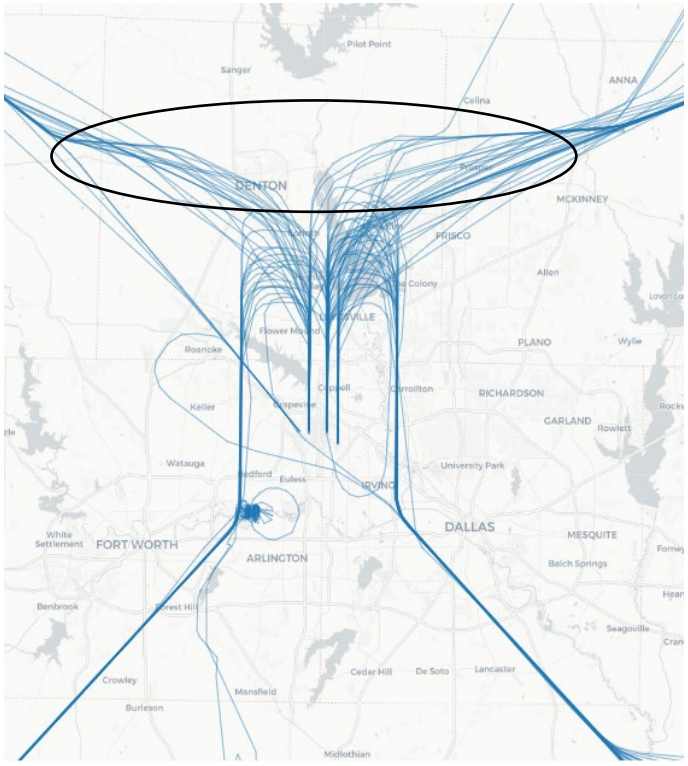
DFW Trial Begins March 2023

- Controllers start with issuing CAS clearances during hazy conditions
  - Pilots can no longer see the airport
  - Use of CDTI allows controllers to have pilots follow designated aircraft
  - Useful for both parallel Finals

- Pilot reactions are mixed at first but change over time
  - Startle factor plays a role early on
  - Section six negotiations didn't help
  - Training by bulletin not popular with pilots
  - Over 80% of pilots accepted the clearance
  - Today near 100%
  - Both pilots and controllers see benefit

CAS-A Flight Distance and Time (Mar-Jun 2023)

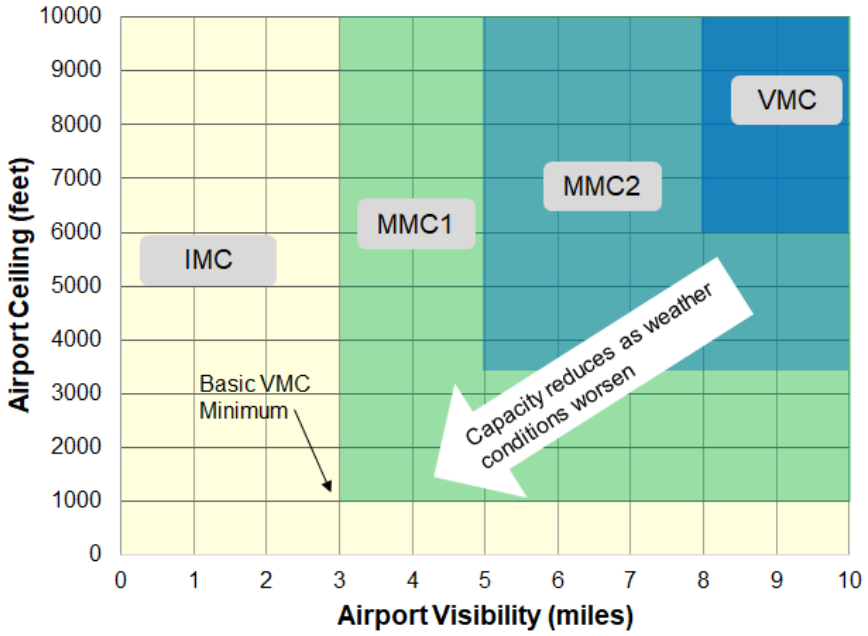
- **Motivation**
  - Reducing IAT and Threshold Spacing for CAS-A/CAVS aircraft is encouraging, but is there an impact on the overall system in terms of reduced flight time or flight distance?
  - Controllers have reported using CAS-A to reduce flight path during certain conditions
- **Analysis Details**
  - DFW arrival trajectories from Threaded Track Mar–Jun 2023
  - CAS-A determination from CountOps, Weather from ASPM
  - Regression analysis with data per arrival
  - Dependent Variables:
    - Flight Time 25NM to runway
    - Flight Distance 25NM to runway
  - **Independent Variables:**
    - Downwind (0= No, 1=Yes)
    - Number of arrivals at airport in past 15 minutes
    - Number of heavy arrivals at airport in past 15 minutes
    - Number of CAS-A arrivals in airport in past 15 minutes
    - IMC (ceiling <1000 feet and visibility<3 miles)
    - MMC1 (ceiling <3500 feet and visibility <5 miles)
    - MMC2 (ceiling <6000 feet and visibility <=8 miles)
    - CAS-A arrivals and IMC
    - CAS-A arrivals and MMC1
    - CAS-A arrivals and MMC2



CAS-A Flight Distance and Time Weather (Mar-Jun 2023)

- **Weather conditions chosen for analysis**
  - IMC uses basic minimums (<1000 ft ceiling or < 3 miles visibility)
  - MMC1 based on a Visual Approach Threshold value listed in ASPM for DFW (<3500 ft ceiling or < 5 miles visibility)
  - MMC2 based on information gathered from facility by J Sparrow (<6000 ft ceiling or <= 8 miles visibility)

Weather Condition	Arrivals	% of Arrivals
IMC	3,415	3%
MMC1	13,209	12%
MMC2	11,044	10%
VMC	85,627	75%
Total	113,295	



CAS-A Flight Distance and Time Benefit (Mar-Jun 2023)

- **CAS-A Arrivals March-June 2023**
  - 871 CAS-A arrivals listed in CountOps data
  - 113,295 total arrivals in same period
  - Less than 1% of total (0.77%)

Preliminary analysis using 4 months of data; full analysis will use 1 year of test data

Benefit per CAS-A arrival in 15 min ahead:	MMC2	All other Wx
Distance (NM)	0.6	0.2
Time (seconds)	14	5

- **Measured and Hypothetical Benefit**

March through June 2023	CAS-A Arrivals in past 15 min								
	0	1	2	3	4	5	6	7	
Arrivals in MMC2	10,261	549	179	55					
Arrivals in other Weather	93,777	5,598	1,983	650	181	46	12	4	**Total**
Benefit in NM	0	1,454	1,012	491	145	46	14	6	**3168**
Benefit in minutes	0.0	595	414	201	60	19	6	2	**1298**

  - Taking the benefit in minutes (1,298 minutes) and multiplying by an assumed airline cost of $60/min results in a savings of $78,000 from Mar-Jun 2023 with only 0.77% of operations receiving CAS-A
  - If 25% of arrivals received a CAS-A clearance the result would be closer to 42,000 minutes and $2,500,000 airline costs

- **Other possible CAS-A benefits**
  - There are other CAS-A benefits besides direct reduction of flight time/distance in TRACON
  - If equipage was higher and IAT could be shown to be smaller and more consistent, then the overall airport arrival rate/acceptance rate could eventually be increased
  - Tactical metering (TBFM) and strategic metering (TFMS/GDPs) could consider equipage in arrival rate calculations
  - Airlines could consider reduction in flight time to examine aircraft utilization

Advantages of IM, CAS, and CAVS

- **Nothing compares to these types of operations**
  - The addition of traffic information allows the controller to have confidence that the flight crew can achieve accurate spacing
  - First time the pilot can "see" the traffic around them in all environmental conditions
  - Already has proven benefit

What have we Learned

- **Cockpit Display of Traffic Information (CDTI) results in better decisions from the pilots**
  - Improves safety
    - Better situational awareness
    - Reduces Go-arounds
  - Improves airspace efficiencies
    - Average reduction in Final spacing
    - More consistent spacing enroute
  - Allows for better pilot/controller coordination
    - Pilot and controller communicating exactly what the controller needs
    - Pilot has more of the big picture and becomes a partner in the controllers needs

Looking Forward

- FAA along with industry developing strategies to achieve airspace efficiencies that allow for expanded use of current airspace and infrastructure
- What role does ADS B In provide to build this plan?
- How do we get there?

Section 547 Update

Juan Narvid (FAA) & Kathy Torrence (FAA)

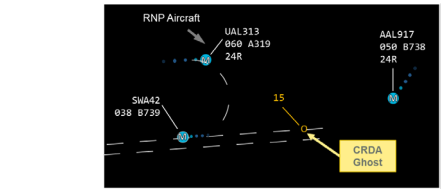
Section 547 Pilot Program:
Preliminary Analysis Results

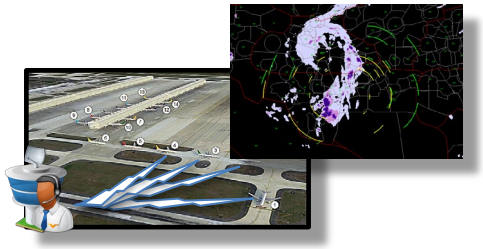
Oct 2023

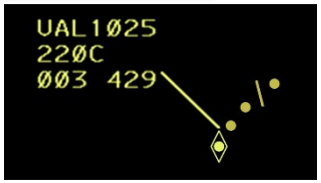
Overview of Selected Section 547 Initiatives

Process: Industry provided FAA a 'short list' of candidate recommendations based on Readiness, Return, & Relevance

Initiative
Simultaneous Independent Established on RNP (EoR) at Los Angeles International Airport (LAX) *(start date: September 12, 2021)*
CPDLC Departure Clearance (DCL) capabilities at Orlando International Airport (MCO) *(Focused metric tracking September 1, 2021)*
Automatic Dependent Surveillance-Broadcast (ADS-B) Out enabling 3 nautical mile (NM) in en route airspace (below FL230) for Oakland Air Route Traffic Control Center (ZOA) *(start date: September 9, 2021)*







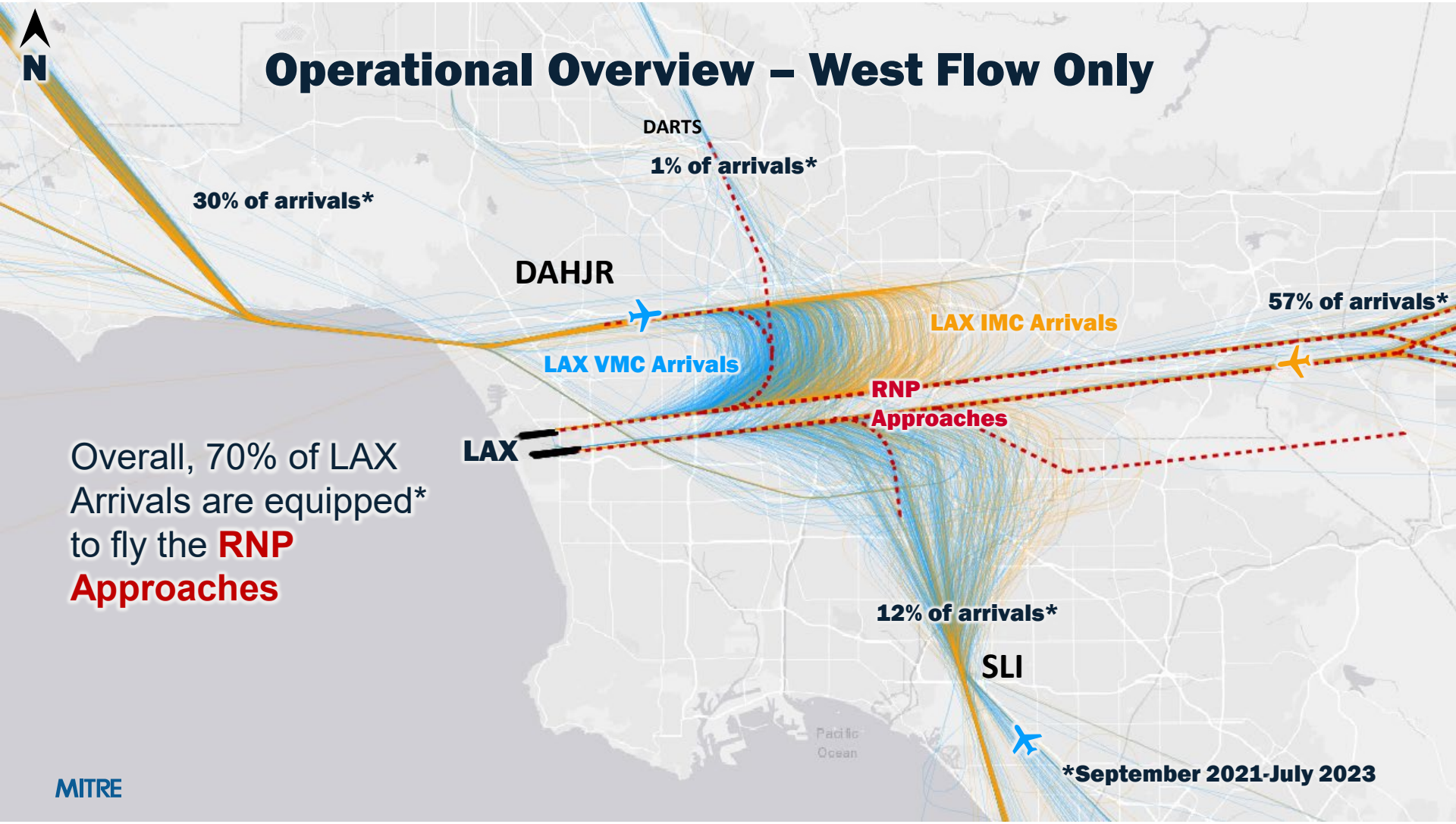
PBN RNP Equipage= Reduced Flight Distance and Flight Time

Data Communication Equipage= Earlier Departure During Rerouting Events, and overall system efficiency

ADS-B Out Equipage= Reduced spacing/distance flown

LAX: ESTABLISHED ON RNP (EOR) INITIATIVE

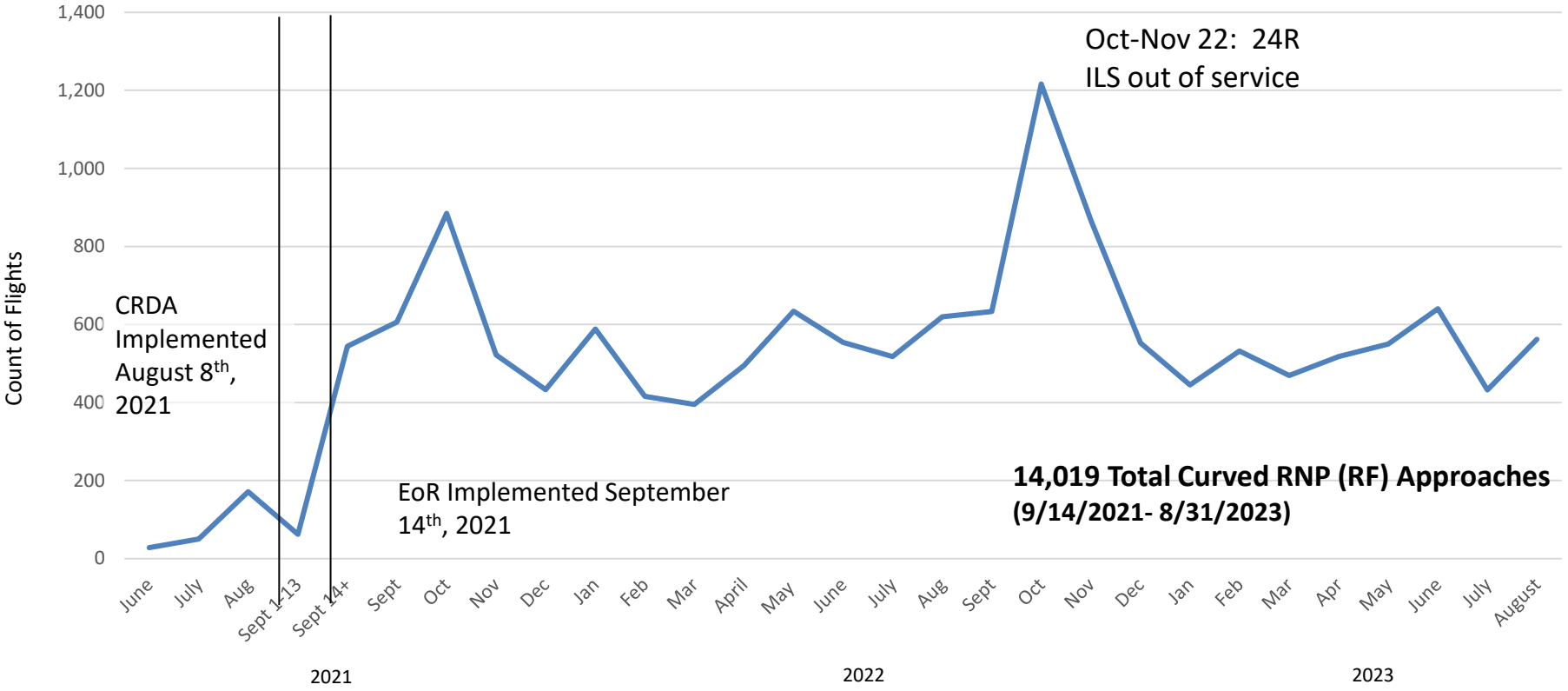
Operational Overview – West Flow Only



Overall, 70% of LAX Arrivals are equipped* to fly the **RNP Approaches**

MITRE

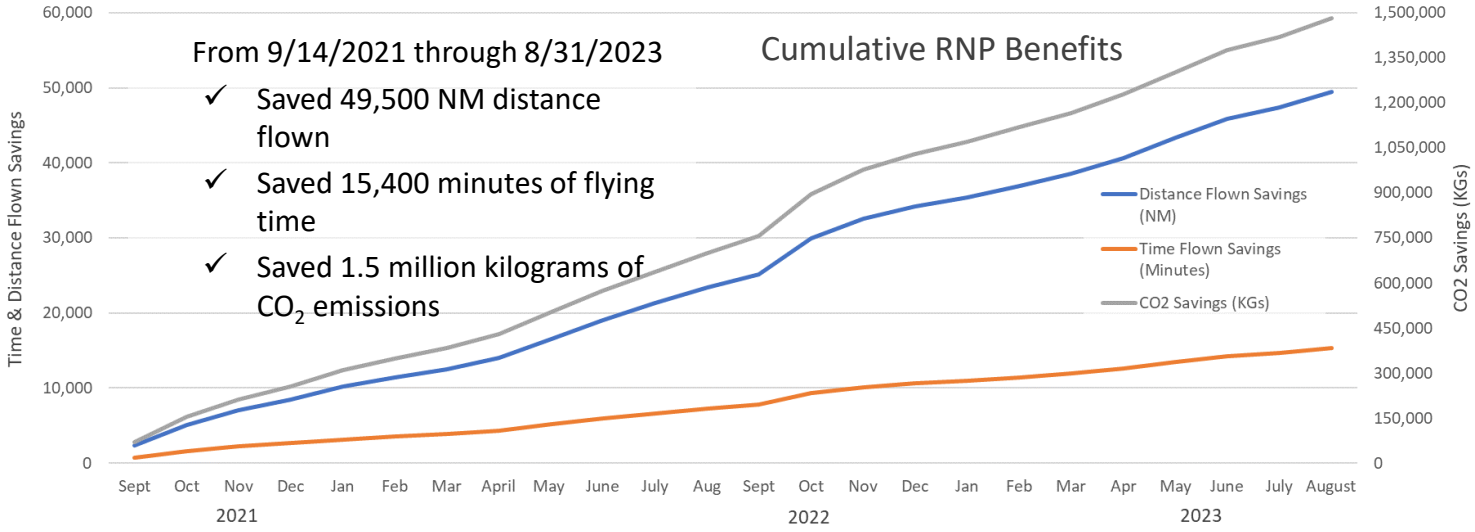
Monthly Curved RNP (RF) Usage – West Configuration Only



RNP RF Benefits – West Flow

Flight Efficiency Improvements for RNP RF vs Non-RNP Approach Operations

	Savings per Flight			
VMC/IMC	**Distance Flown (NM)**	**Time Flown (Minutes)**	**Fuel Burn (Gallons)**	**CO_2 Emissions (kgs)***
VMC	**2.7**	**0.8**	**8.9**	**86.8**
IMC	**6.8**	**2.1**	**18.2**	**177.2**

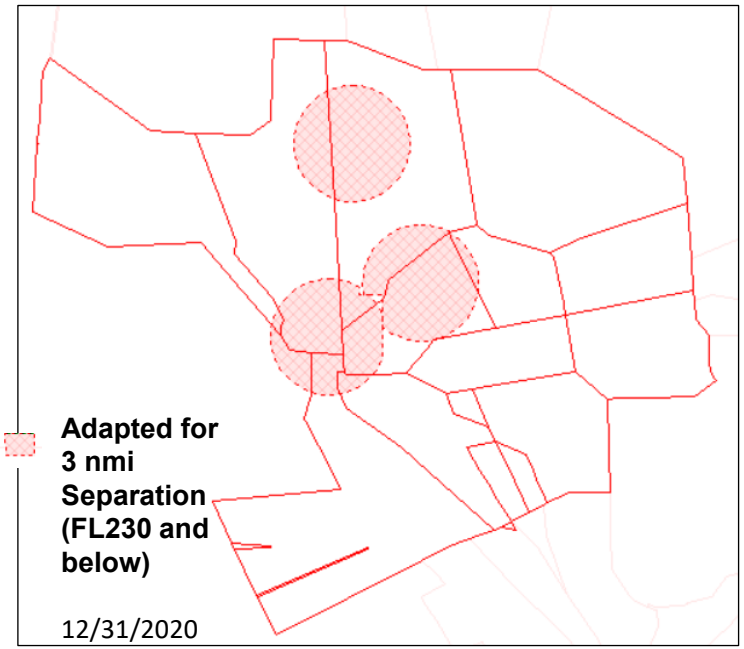


*CO_2 emissions use the latest U.S. Energy Information Administration (EIA) coefficient for jet fuel which is 9.75 kgs CO_2 per gallon of fuel.

ZOA: ADS-B OUT, 5NM TO 3NM REDUCED SEPARATION INITIATIVE

Rule Change – Enabling 3NM Separation below FL230

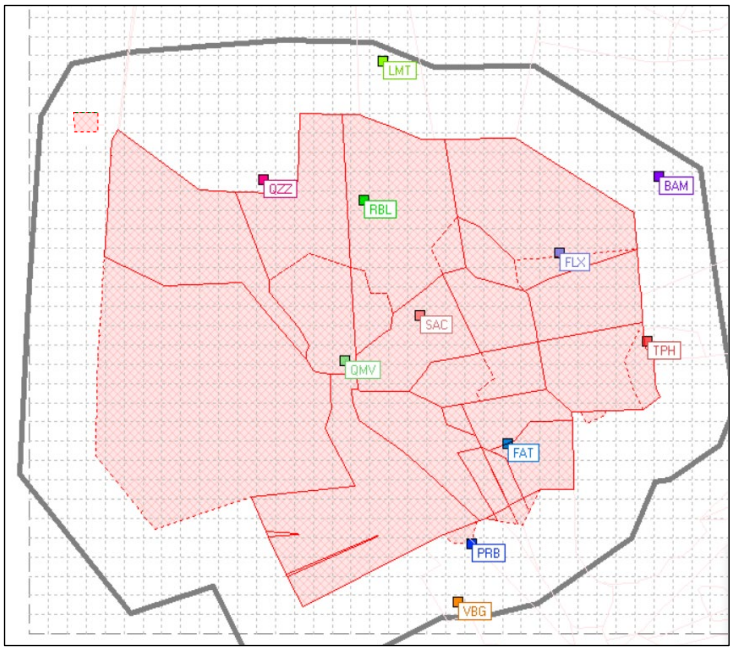
Leveraging ADS-B Out Equipage



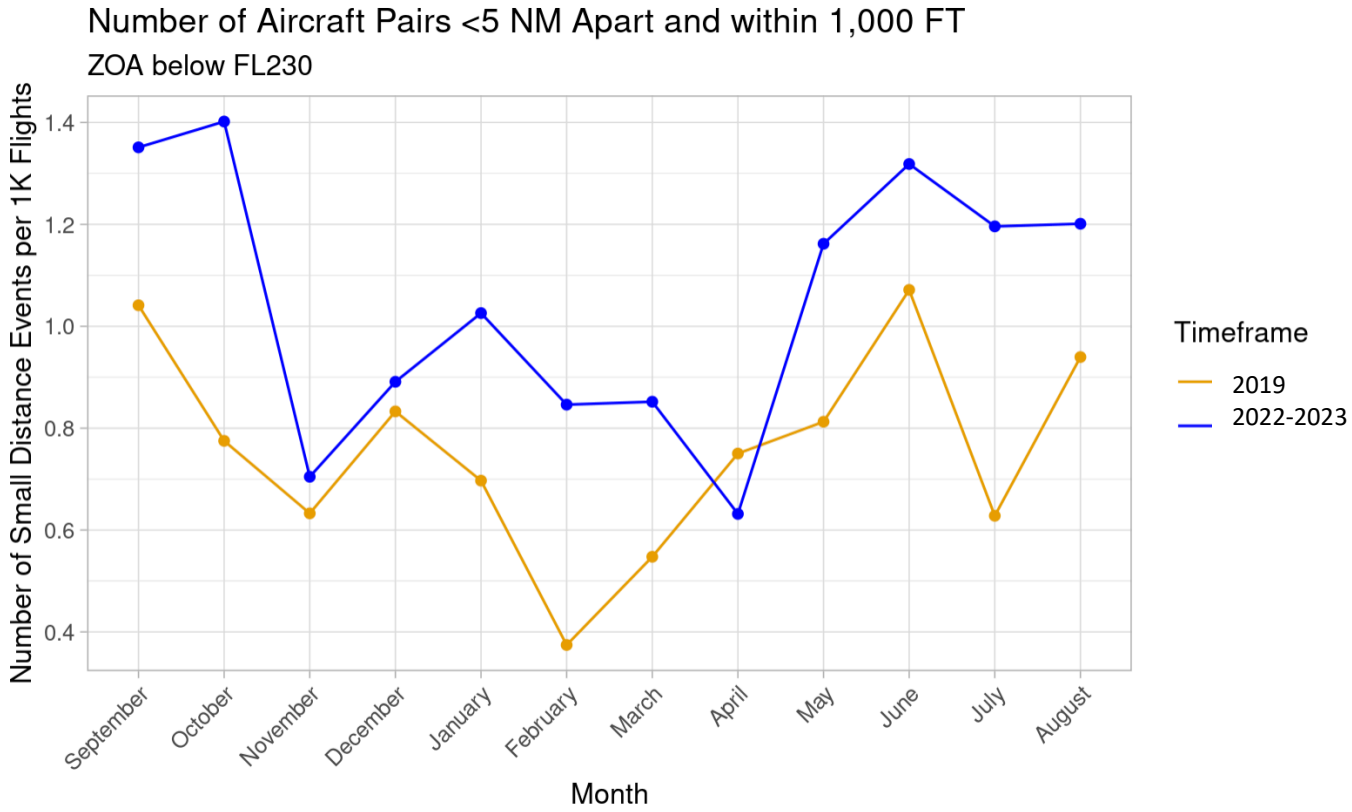
Adapted for 3 nmi Separation (FL230 and below)

12/31/2020

Adapted for 3 nmi Separation (FL230 and below)
10/12/2021

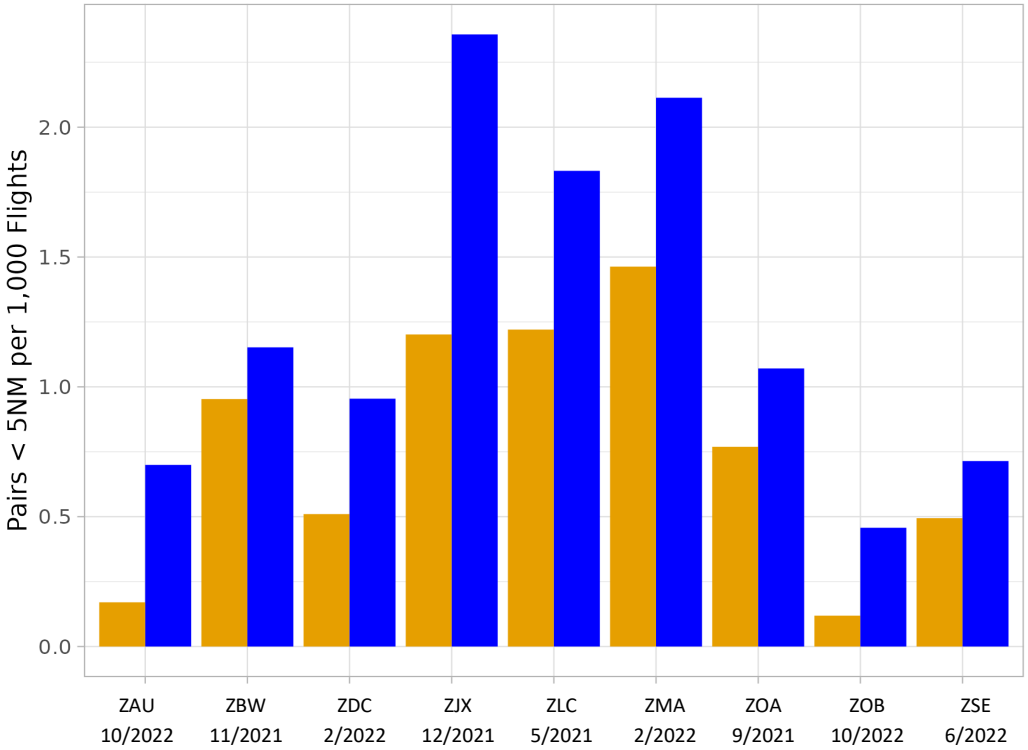


Month-to-Month Comparison (ZOA)



All Centers with 3NM Separation Implemented

of Pairs < 5NM per 1,000 Flights

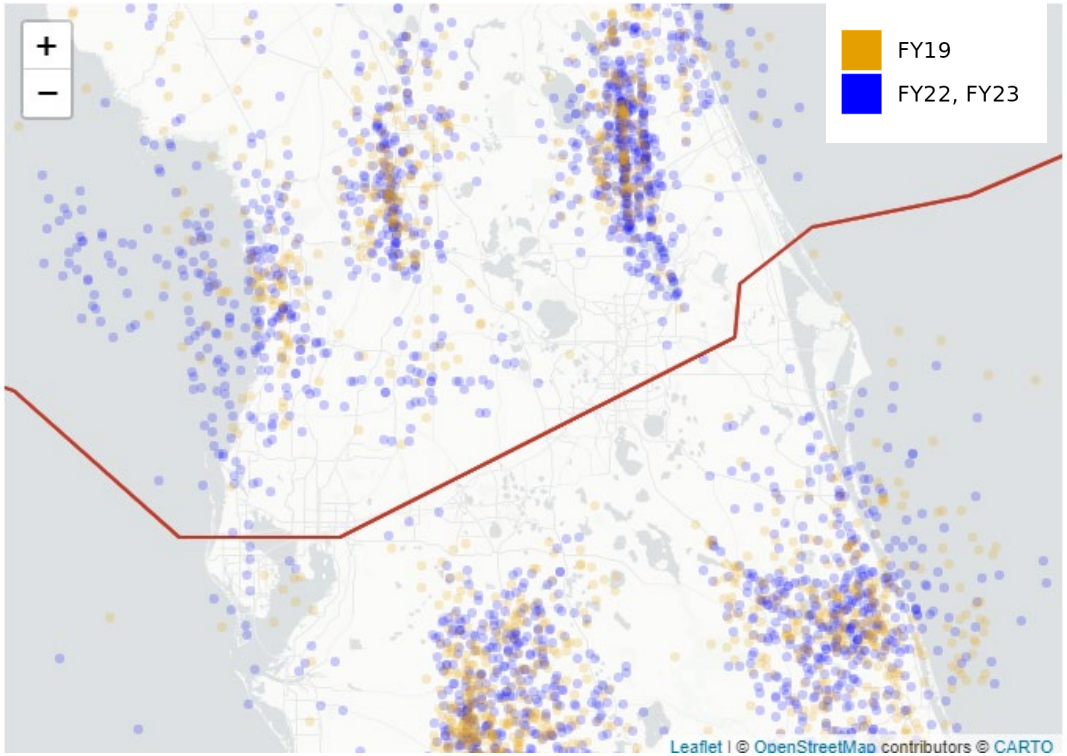


Evaluation Timeframes

Centers	Baseline	Post
ZBW, ZDC, ZJX, ZLC, ZMA, ZOA, ZSE	01/2019 – 12/2019	09/2022 – 08/2023
ZAU, ZOB	11/2018 – 06/2019	11/2022 – 08/2023

ZMA and ZJX Zoom

Opportunities increased close to center boundary because of uniform separation standards



MCO: CPDLC DEPARTURE CLEARANCE CAPABILITIES

Section 547 Data Comm: Orlando Metrics

August 2023

L3HARRIS

Federal Aviation Administration

Initiative Description

CPDLC Departure Clearance (DCL) **capabilities at Orlando International Airport** (MCO)

- **Overview**

  Use of DCL can provide CPDLC equipped operators revised departure clearances in a more time-efficient manner compared to unequipped operators. This is especially beneficial when reroutes are necessary due to weather or other air traffic disruptions.

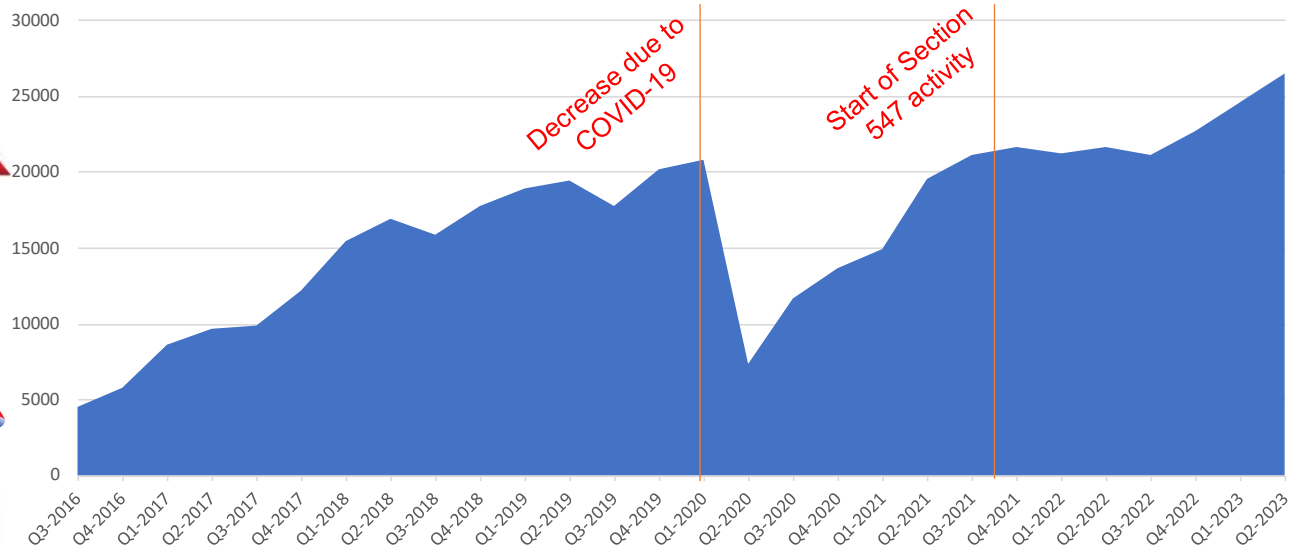
- **Anticipated Benefits**

  Minutes of Airspace User Time Saved and kilograms of CO_2 Emissions Prevented

- **Start Date**

  Focused data collection and metric tracking beginning 9/1/2021

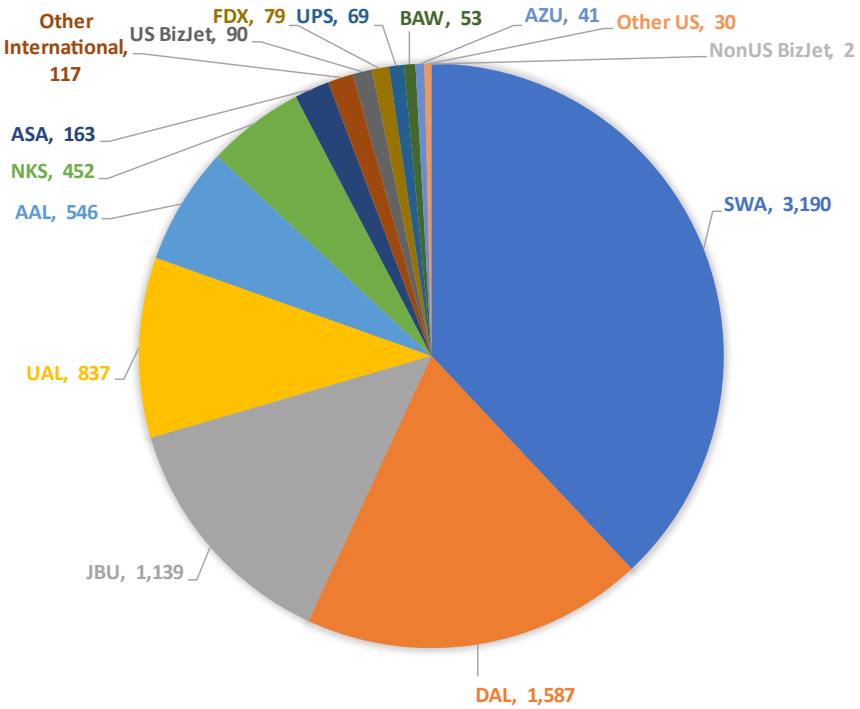
Orlando CPDLC DCL Departures



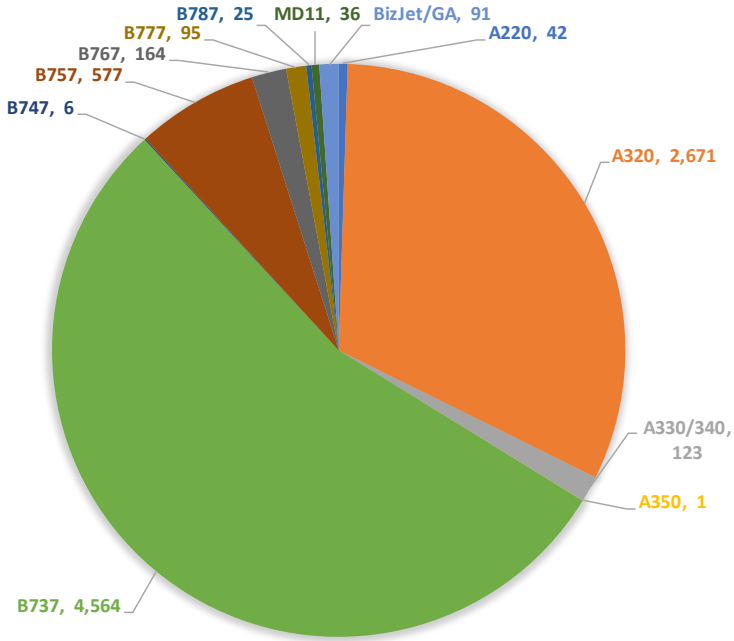
Orlando CPDLC DCL Clearances

August 2023

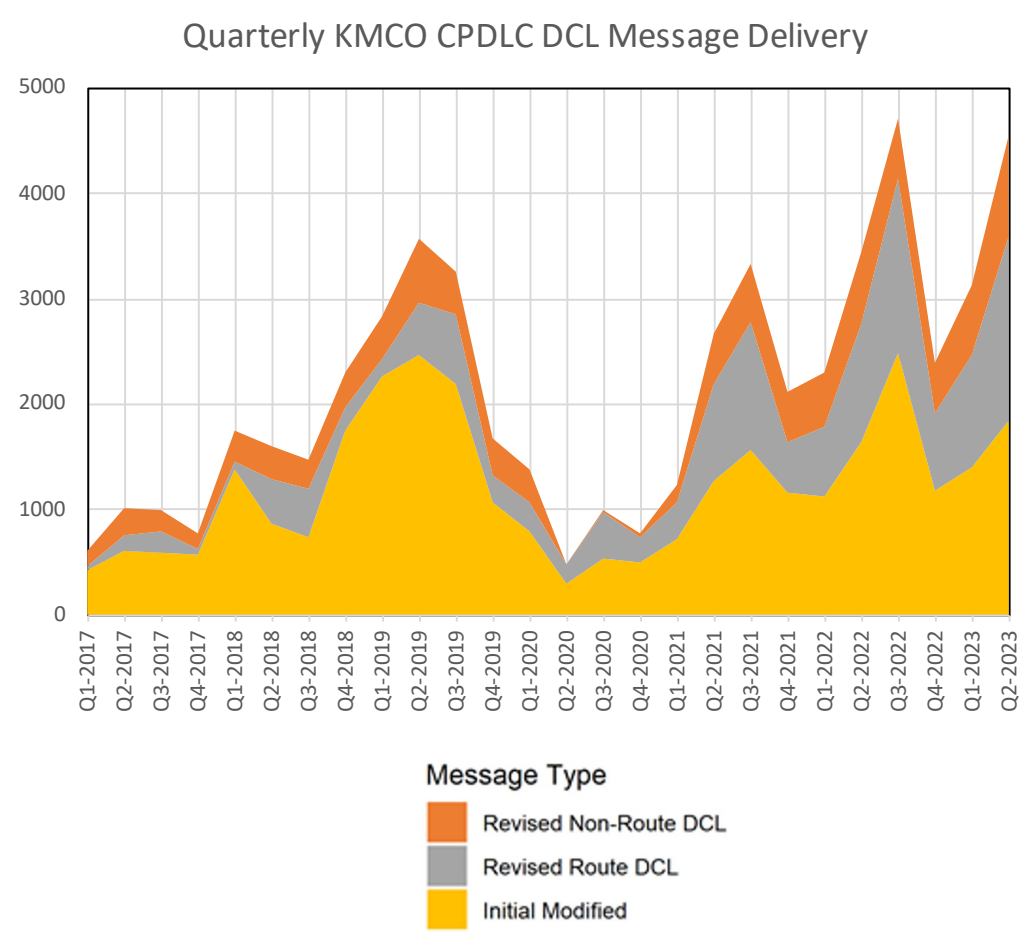
By Operator



By Aircraft Type



Orlando CPDLC DCL Messages Delivered



Cleared as Filed	The participating flight receives no changes/modifications to their original/intended route of flight filed in their flight plan.
Initial Modified	The participating flight receives a change to their original/intended route of flight on the filed flight plan, this change could be a route or non-route change.
Revised Route DCL	The participating flight receives a change/modification to their original/intended route of flight on the filed flight plan that resulted in a route change from air traffic control.
Revised Non-Route DCL	The participating flight receives a change to their original/intended route of flight on the filed flight plan. This change/modification only affected non-route information such as, but not limited to, squawk code or departure frequency.

Orlando CPDLC DCL Benefits

Since January 2021

- Cleared 205,949 flights
- Saved 40,872 minutes of airspace user time (gate and taxi)
- Prevented 1.06M kgs of CO_2 Emissions

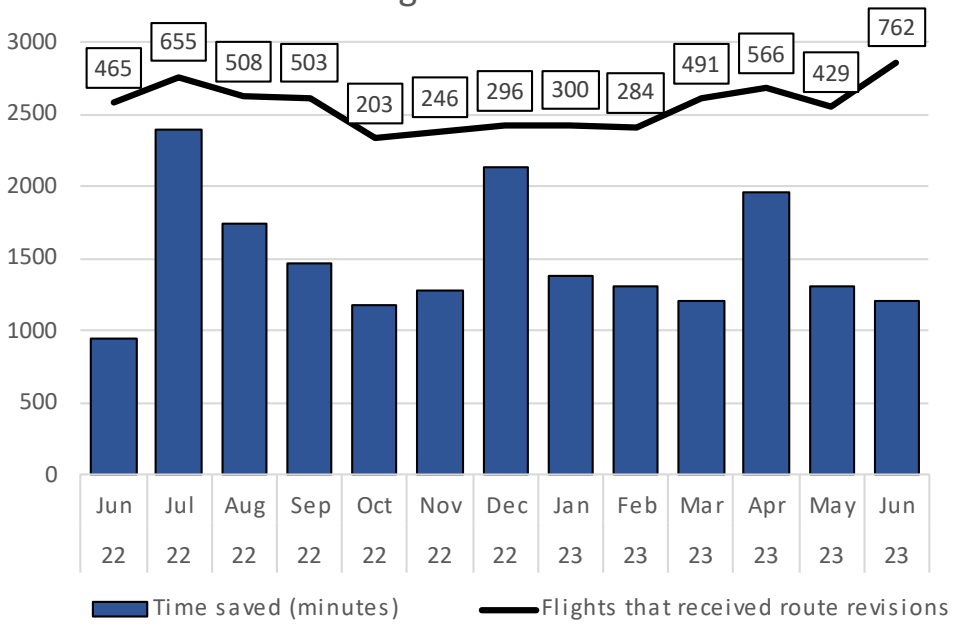
In June 2023

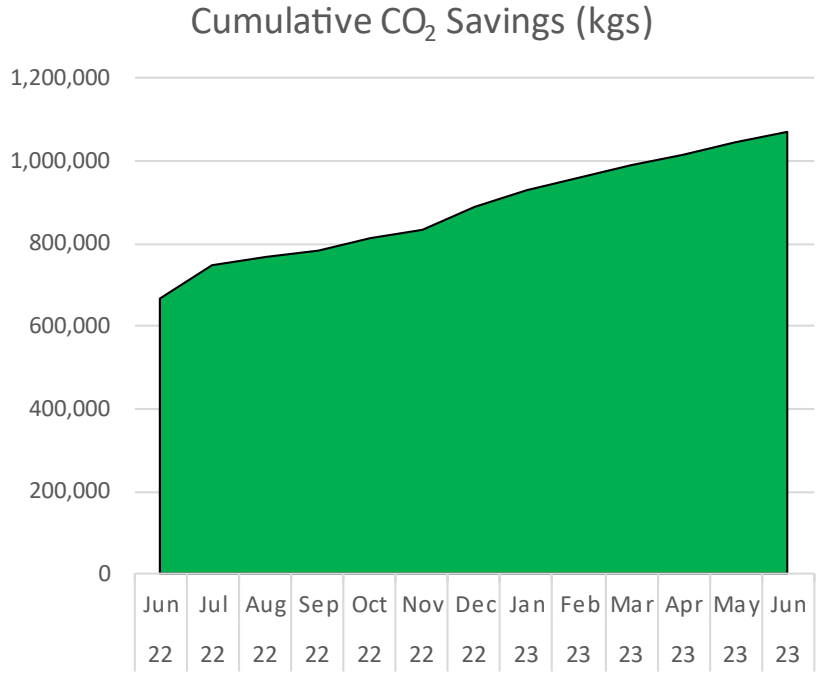
- Cleared 8,527 flights
- Saved 1,211 minutes of airspace user time (gate and taxi)
- Prevented 23,129 kgs of CO_2 Emissions

**Benefits are derived using ASPM data which is verified 3 months after the month closes.*

Orlando CPDLC DCL Benefits Trend

Time Savings and Emission Reductions





**Benefits are derived using ASPM data which is verified 3 months after the month closes.*

Review of Action Items & Other Business

Kimberly Noonan, NAC Committee Manager (FAA)

DFO Comments

Katie Thomson, Deputy Administrator & NAC Designated Federal Officer (FAA)

Closing Comments & Adjourn

Chip Childs, NAC Chair

President & CEO (SkyWest Airlines)