



ATM Metrics and CAR Airspace

Ernie Snyder

**ICAO NACC Regional Officer
Air Traffic Management and Search and Rescue**





Metrics

Measuring to Improve



Why use metrics

- ✈ To see where we stand
- ✈ To track progress
- ✈ To measure progress
- ✈ To see where improvements can be made
- ✈ To challenge



We have always measured success

✈ In kindergarten we received a + or -

✈ Later, it was an a-f system

✈ Next a numerical value 0-100%



We have always measured success





Henry Ford Model T- *"Any customer can have a car painted any color that he wants so long as it is black."*

Rank	Color	Percentage Share
1	White	23.9%
2	Black	23.2%
3	Gray	15.5%
4	Silver	14.5%
5	Red	10.3%
6	Blue	9.0%
7	Brown	1.4%
8	Green	0.7%
9	Beige	0.4%
10	Orange	0.4%



Colors matter

✈ Rental Cars- Silver retains higher re-sale

✈ By gender- Men prefer red, women silver

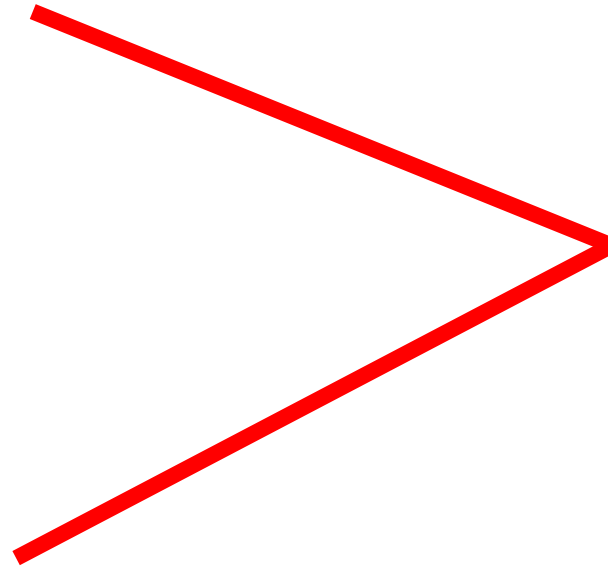
✈ Location-

Colour distribution (%)								
Colour ↕	North America		Europe		Asia-Pacific		World	
	PPG ↕	DP ↕	PPG ↕	DP ↕	PPG ↕	DP ↕	PPG ↕	DP ↕
White	21	24	23	24	23	22	22	23
Silver	16	16	13	14	23	14	20	18
Black	19	19	21	23	19	21	19	21
Grey	16	15	17	15	8	20	12	14
Blue	8	7	7	8	7	5	7	6
Red	10	10	7	6	9	7	9	8
Brown	7	5	7	6	10	6	7	6
Green	3	2	2	1	1	1	2	1
Others		2	3	3		4	1	3



Some Airline Metrics

- General Airline Operations KPIs
- Passenger KPIs
- Operations Control KPIs
- Connex Management KPIs
- Weight & Balance KPIs
- Baggage Management KPIs
- Airline Punctuality KPIs
- Fuel & Environmental KPIs
- Maintenance KPIs
- Crew KPIs
- General Performance KPIs
- Crisis KPIs



77



Passenger KPIs

Passengers en Route

Passengers En-Route reflect a real-time performance figure. The KPI provides benefits in terms of corporate-wide awareness but is also used as a motivational factor. It's simply calculated as the sum of all boarded passengers for flights en-route.

Satisfied Passenger Quota

The Satisfied Passenger Quota is an advanced but incredibly insightful KPI. The KPI calculates passengers' share that arrived on-time at the scheduled airport concerning all transported passengers.

Unsatisfied Passengers Quota

Like the above, the KPI calculates passengers' share arriving late or not at destination in relation to all transported passengers.

Disruption Affected Passengers

Another very insightful airline operations KPI. The indicator reflects the number of passengers affected by major (cancellation, diversion, etc.) or minor (delay) disruptions.



Airline Punctuality KPIs

Block Time Recovery

It calculates the share of flights with a delayed departure ($ATD > STD$) but on-time arrival. In other words: Flights that recovered a delay during flight time.

Average Taxi-In / Taxi-Out Time

The KPI represents the average time between a touchdown and on-blocks / off-blocks and airborne of aircraft. The KPI is usually only tracked for important hubs/home bases.



Airline Performance KPIs

Aircraft Utilization / Productivity

Aircraft utilization (or productivity) represents a common KPI of the industry. The KPI calculates total operated block hours and put them to available hours (depending on definition).

Profitability

Some airlines can calculate the profitability of each flight on-the-fly. The KPI is typically used to assess schedule changes. Moreover, the KPI is presented as overall profitability or clustered to aircraft types, routes, or traffic regions.

Compensation Costs

Compensation costs reflect another extremely valuable KPI. The indicator calculates the compensation costs due to delayed/canceled flights and related aspects (passengers, delay reasons, traffic region, etc.)



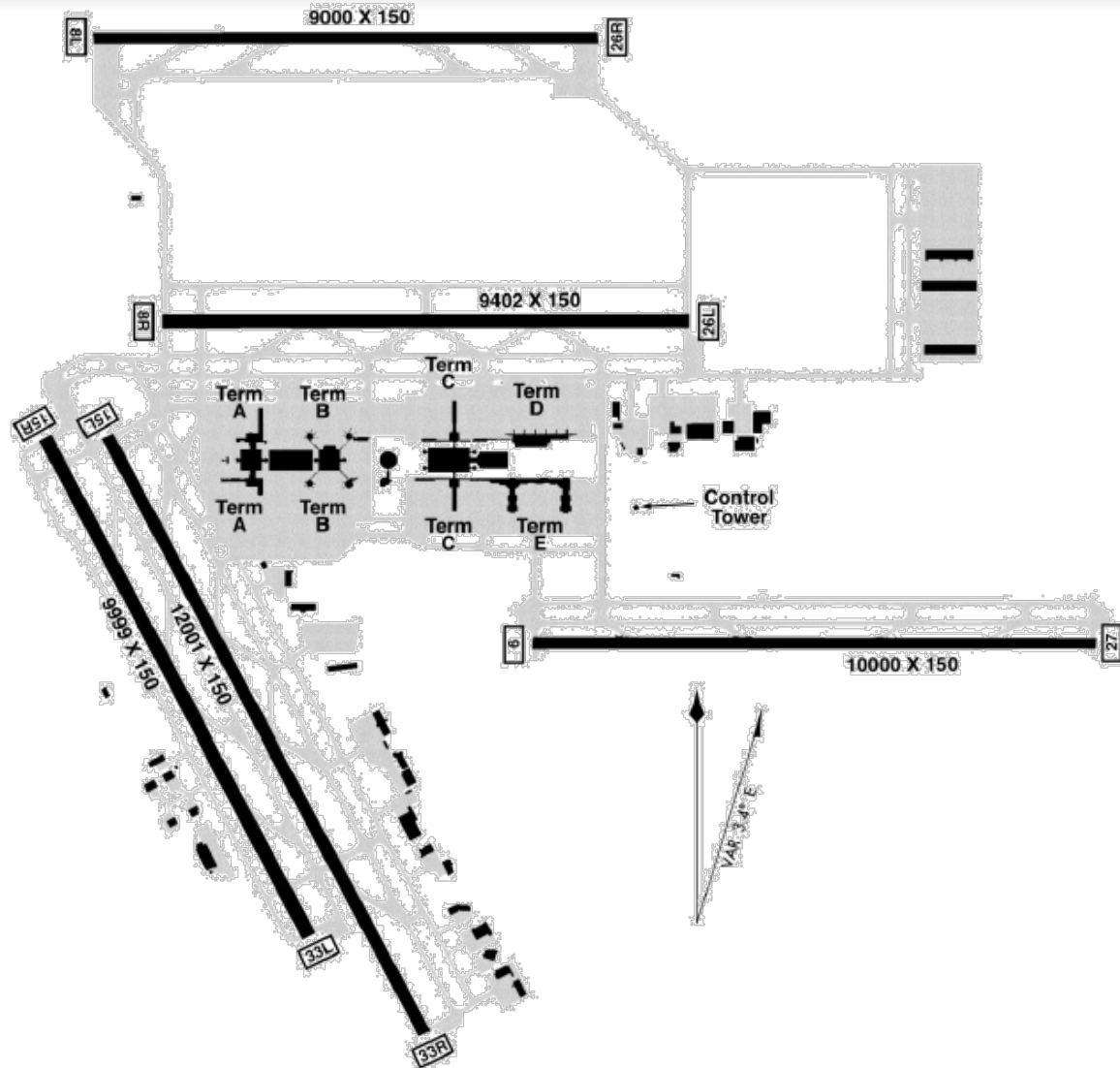
Some Airline Metrics

- **Misconnex Quota**
- **Arrival Punctuality**
- **Seat Load Factor**
- **Delay Reasons**
- **Regularity**
- **Departure Punctuality**





ICAO CAPACITY & EFFICIENCY





Facility	OPSNET Ops	OPSNET Delays	Cancellations		Average Taxi Out	Departure Delays	Airborne Holding		Diversions	Completion Rate
			Departure	Arrival			Events	Minutes		
	1,106	0	5	4	17.50	0	0	0	1	99.27
	700	0	2	0	10.39	0	1	23	3	100.00
	1,141	6	2	8	27.29	6	0	0	0	98.48
	2,461	13	11	25	19.82	12	0	0	0	97.92
	716	0	1	1	11.55	4	0	0	1	99.60
	1,673	28	4	9	18.99	24	0	0	0	98.90
	589	7	2	2	15.83	16	0	0	1	99.03
	1,286	101	1	4	27.41	100	0	0	0	99.35
Total	9,672	155	28	53	20.06	162	1	23	6	98.81

TRACON							
Facility	Ops	Seasonal Daily AVG	%VAR From AVG	Total Delays	Airborne Delays	Departure Delays	TMI Delays
	3510	3346	5	0	0	0	0
	1443	1372	5	0	0	0	0
	1384	1375	1	0	0	0	0
	3387	3403	0	0	0	0	0
	2317	2513	-8	16	0	0	16
	849	845	0	0	0	0	0
Total	12890	12854		16	0	0	16

ARTCC							
Facility	Ops	Seasonal Daily AVG	%VAR From AVG	Total Delays	Airborne Delays	Departure Delays	TMI Delays
	6943	6475	7	0	0	0	0
	6076	5706	6	0	0	0	0
	5660	5175	9	0	0	0	0
	7108	6374	12	17	17	0	0
	4440	4325	3	1	0	0	1
	6850	6596	4	2	0	0	2
	6480	6453	0	5	1	0	4
	5125	4974	3	6	6	0	0
Total	48682	46078		31	24	0	7



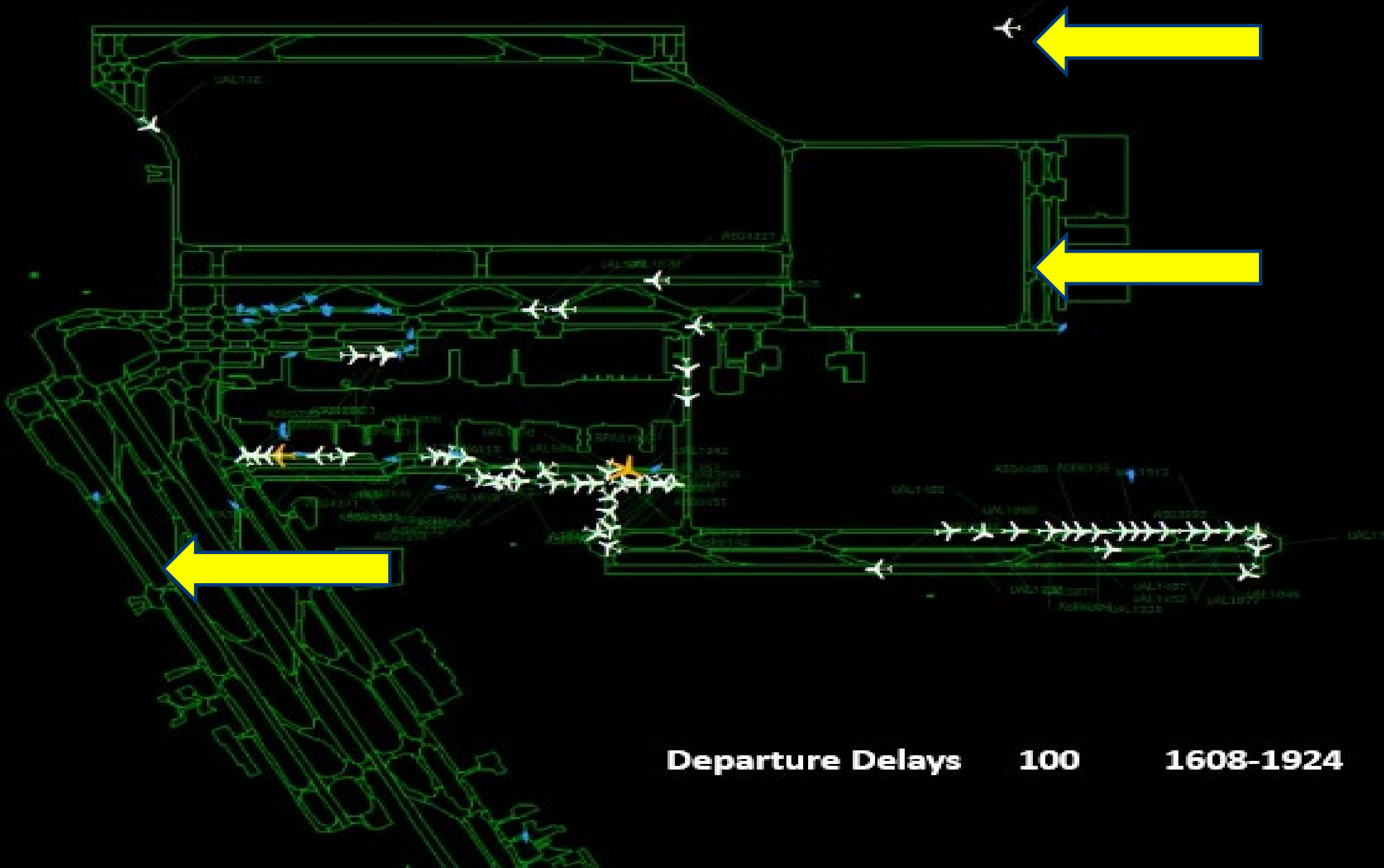
Facility	OPSNET Ops	OPSNET Delays	Cancellations		Average Taxi Out	Departure Delays	Airborne Holding		Diversions	Completion Rate
			Departure	Arrival			Events	Minutes		
	1,106	0	5	4	17.50	0	0	0	1	99.27
	700	0	2	0	10.39	0	1	23	3	100.00
	1,141	6	2	8	27.29	6	0	0	0	98.48
	2,461	13	11	25	19.82	12	0	0	0	97.92
	716	0	1	1	11.55	4	0	0	1	99.60
	1,673	28	4	9	18.99	24	0	0	0	98.90
	589	7	2	2	15.83	16	0	0	1	99.03
	1,286	101	1	4	27.41	100	0	0	0	99.35
Total	9,672	155	28	53	20.06	162	1	23	6	98.81

TRACON							
Facility	Ops	Seasonal Daily AVG	%VAR From AVG	Total Delays	Airborne Delays	Departure Delays	TMI Delays
	3510	3346	5	0	0	0	0
	1443	1372	5	0	0	0	0
	1384	1375	1	0	0	0	0
	3387	3403	0	0	0	0	0
	2317	2513	-8	16	0	0	16
	849	845	0	0	0	0	0
Total	12890	12854		16	0	0	16

ARTCC							
Facility	Ops	Seasonal Daily AVG	%VAR From AVG	Total Delays	Airborne Delays	Departure Delays	TMI Delays
	6943	6475	7	0	0	0	0
	6076	5706	6	0	0	0	0
	5660	5175	9	0	0	0	0
	7108	6374	12	17	17	0	0
	4440	4325	3	1	0	0	1
	6850	6596	4	2	0	0	2
	6480	6453	0	5	1	0	4
	5125	4974	3	6	6	0	0
Total	48682	46078		31	24	0	7



Departure Delays 100 1608-1924



Departure Delays 100 1608-1924

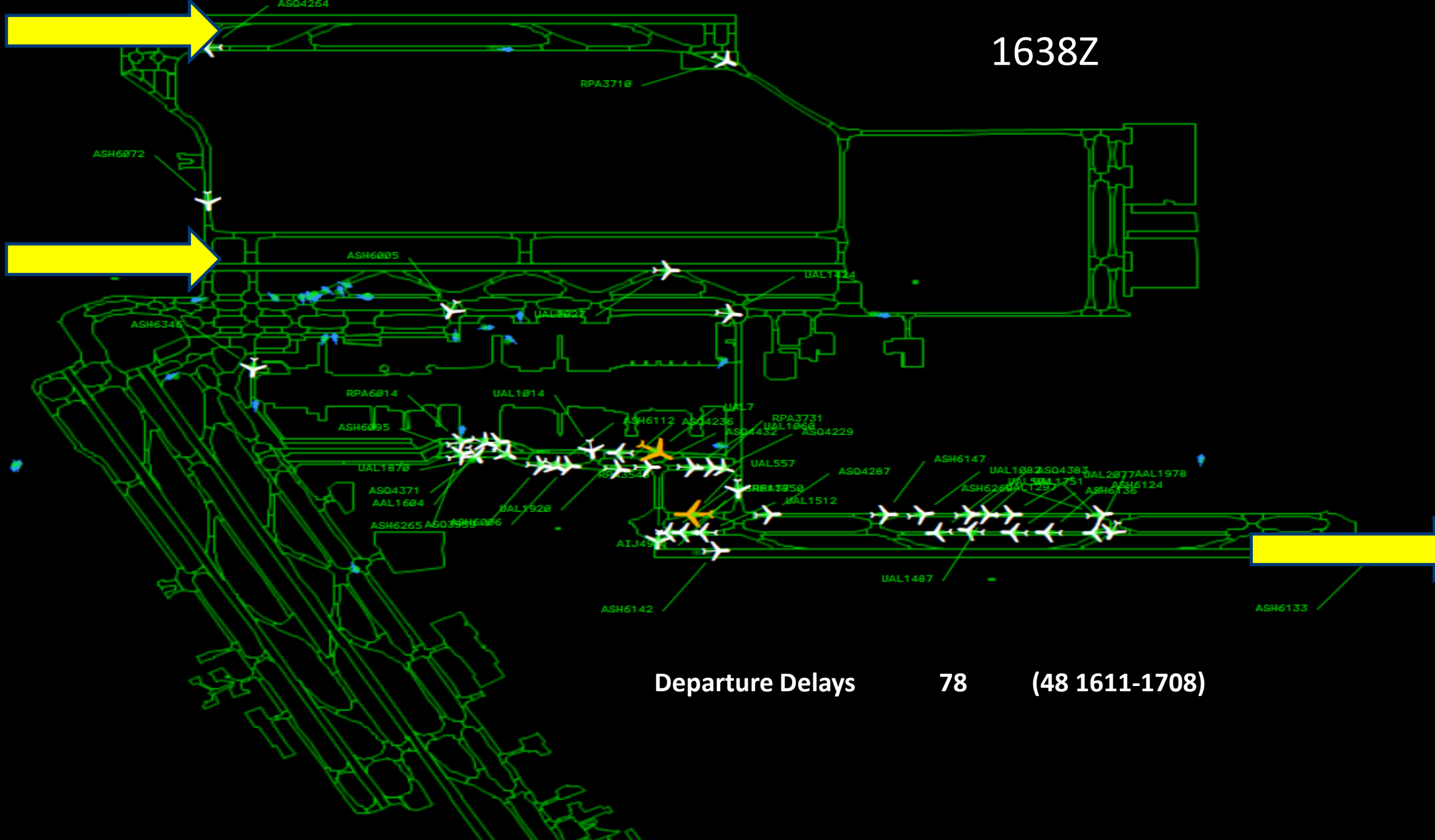


Facility	OPSNET Ops	OPSNET Delays	Cancellations		Average Taxi Out	Departure Delays	Airborne Holding		Diversions	Completion Rate
			Departure	Arrival			Events	Minutes		
	1,110	2	2	2	17.24	0	0	0	0	99.64
	725	0	5	2	10.51	0	0	0	1	99.32
	1,164	2	3	1	32.82	2	1	15	0	99.81
	2,434	23	12	9	19.50	21	0	0	1	99.25
	692	0	1	2	10.61	3	0	0	1	99.21
	1,759	40	5	5	18.85	41	0	0	1	99.42
	586	3	1	0	12.96	0	0	0	2	100.00
	1,270	84	4	7	22.55	78	0	0	1	98.85
Total	9,740	154	33	28	19.72	145	1	15	7	99.38

TRACON							
Facility	Ops	Seasonal Daily AVG	%VAR From AVG	Total Delays	Airborne Delays	Departure Delays	TMI Delays
C90	3579	3341	7	0	0	0	0
D21	1495	1412	6	0	0	0	0
M98	1383	1368	1	0	0	0	0
D10	3561	3498	2	0	0	0	0
I90	2311	2599	-11	0	0	0	0
T75	943	858	10	0	0	0	0
Total	13272	13076		0	0	0	0

ARTCC							
Facility	Ops	Seasonal Daily AVG	%VAR From AVG	Total Delays	Airborne Delays	Departure Delays	TMI Delays
ZAU	7115	6509	9	0	0	0	0
ZID	6498	5846	11	0	0	0	0
ZMP	5636	5245	7	2	2	0	0
ZOB	7288	6450	13	1	1	0	0
ZAB	4562	4420	3	0	0	0	0
ZFW	7039	6723	5	5	0	0	5
ZHU	6444	6576	-2	1	0	0	1
ZKC	5451	5054	8	0	0	0	0
Total	50033	46823		9	3	0	6

1638Z



Departure Delays 78 (48 1611-1708)

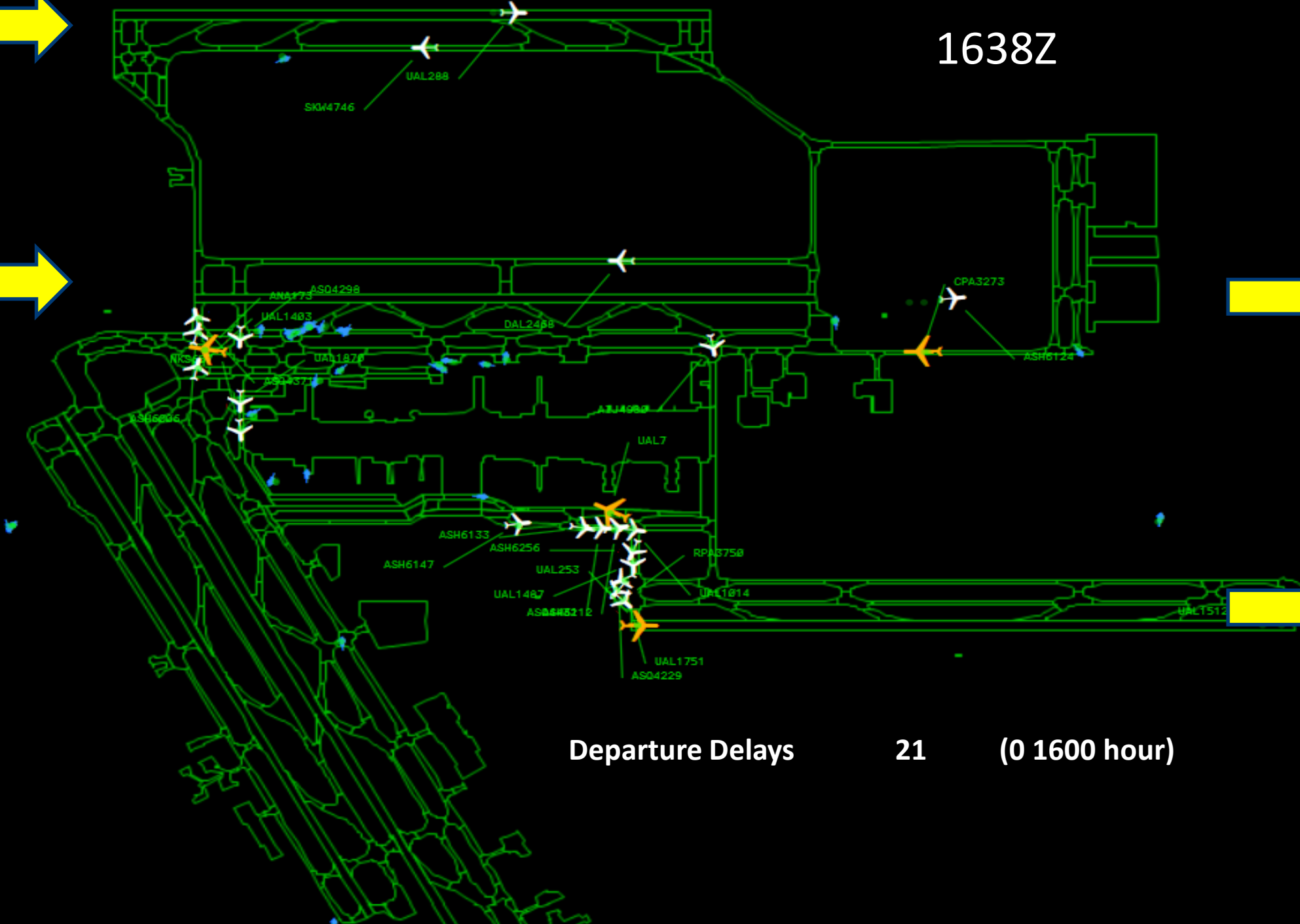


Facility	OPSNET Ops	OPSNET Delays	Cancellations		Average Taxi Out	Departure Delays	Airborne Holding		Diversions	Completion Rate
			Departure	Arrival			Events	Minutes		
	1,138	0	2	5	39.32	0	0	0	0	99.12
	739	0	4	3	12.40	0	0	0	0	99.00
	1,188	0	1	3	19.50	0	0	0	0	99.46
	2,490	0	10	7	21.50	0	0	0	0	99.43
	709	0	2	7	11.76	1	0	0	3	97.22
	1,882	9	5	10	18.58	9	0	0	1	98.93
	567	4	2	0	13.98	0	0	0	0	100.00
	1,274	30	1	2	22.83	21	0	0	3	99.68
Total	9,987	43	27	37	21.59	31	0	0	7	99.21

TRACON							
Facility	Ops	Seasonal Daily AVG	%VAR From AVG	Total Delays	Airborne Delays	Departure Delays	TMI Delays
C90	3671	3249	13	0	0	0	0
D21	1534	1338	15	0	0	0	0
M98	1492	1333	12	0	0	0	0
D10	3696	3358	10	1	0	0	1
I90	2369	2563	-8	0	0	0	0
T75	954	805	19	0	0	0	0
Total	13716	12646		1	0	0	1

ARTCC							
Facility	Ops	Seasonal Daily AVG	%VAR From AVG	Total Delays	Airborne Delays	Departure Delays	TMI Delays
ZAU	7276	6344	15	0	0	0	0
ZID	6542	5596	17	3	3	0	0
ZMP	5763	5075	14	1	0	0	1
ZOB	7504	6328	19	0	0	0	0
ZAB	4621	4348	6	1	1	0	0
ZFW	7269	6535	11	8	0	0	8
ZHU	6313	6478	-3	3	0	0	3
ZKC	5630	4805	17	0	0	0	0
Total	50918	45509		16	4	0	12

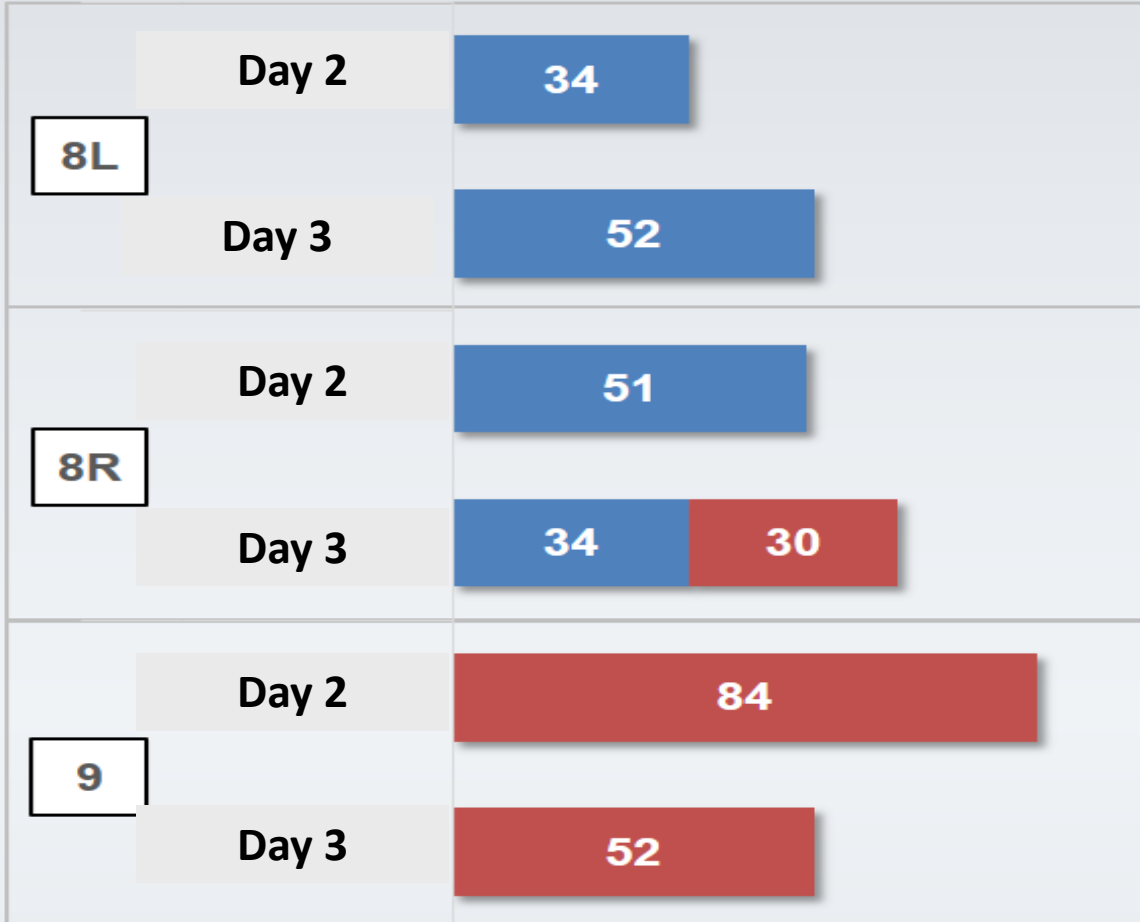
1638Z



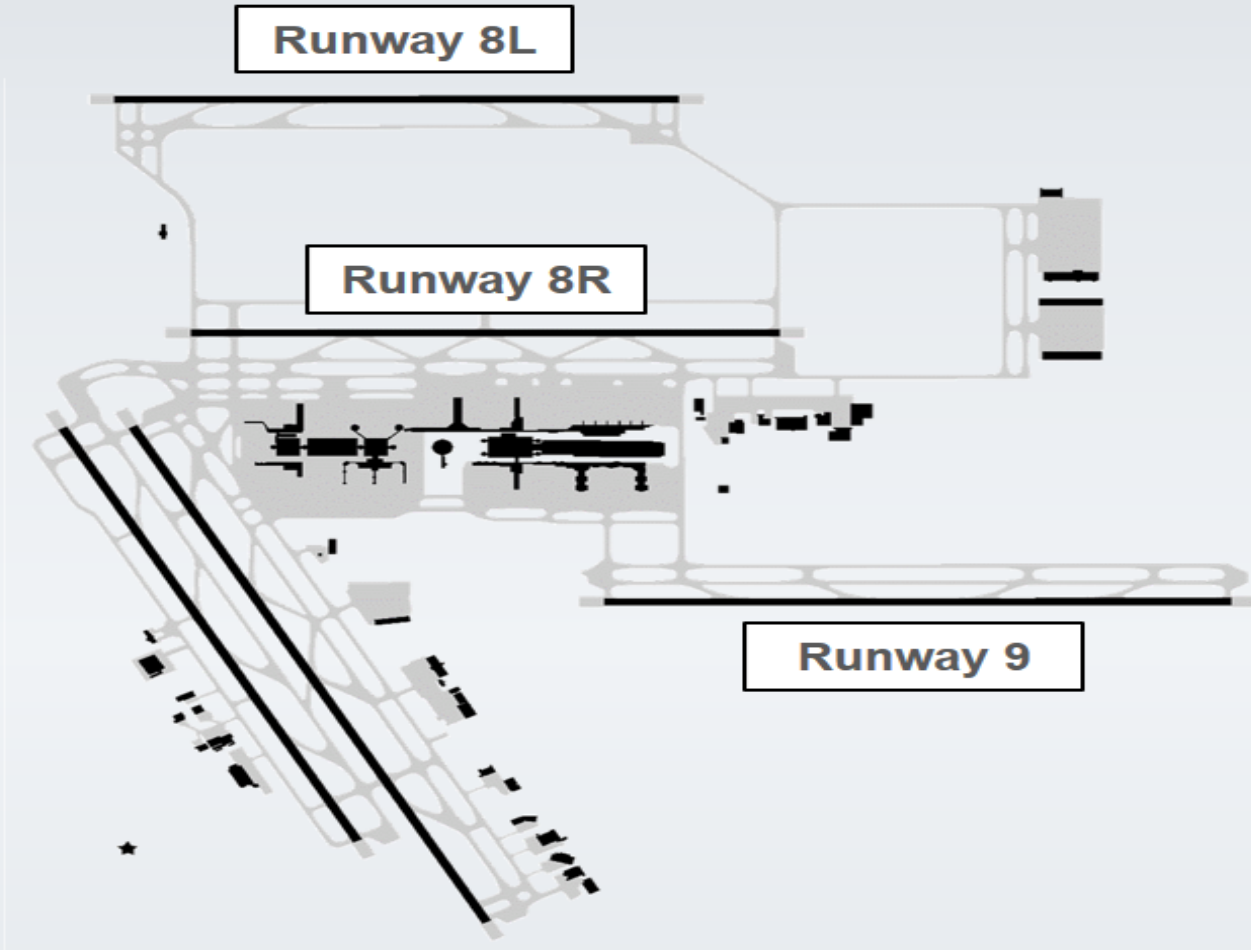
Departure Delays 21 (0 1600 hour)

Runway Usage

1600-1759z



■ Arrivals ■ Departures





Day 2 vs Day 3

Day 2- Operations= **1270**

Day 3-Operations= **1274**

✈ Dept Dlys 78 19 avg 28 max

✈ TMI Dlys 6

✈ Airb Dlys 0

✈ Taxi Out time 22.52

✈ Taxi In time 9.09

✈ Total Reportable delay time **1482** mins

✈ Dept Dlys 21 18 avg 27 max

✈ TMI Dlys 6

✈ Airb Dlys 0

✈ Taxi Out time 22.8

✈ Taxi In time 9.6

✈ GS dlys 3 avg dly 31

✈ Total Reportable delay time **471** mins

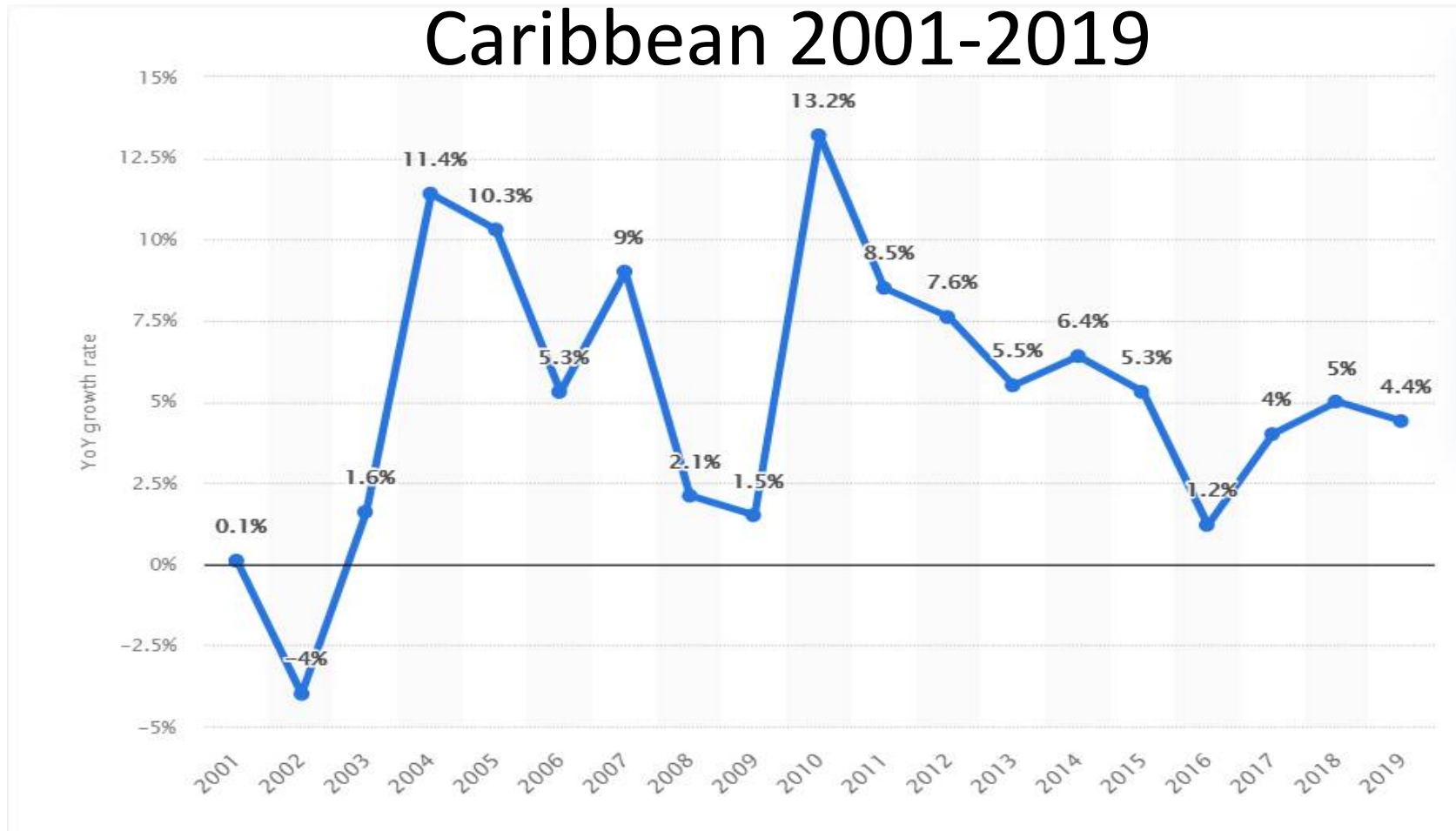
16+ hours

SPECI KIAH 06**1603**Z 02010KT 3SM +RA BR
SCT011 BKN047 OVC065 07/05 A3033 RMK
AO2 P0002 T00670050

METAR KIAH 07**1553**Z 07008KT 7SM -RA
OVC033 07/05 A3031 RMK AO2 SLP263
P0008 T00670050



Change in number of air passengers in Latin America and the Caribbean 2001-2019

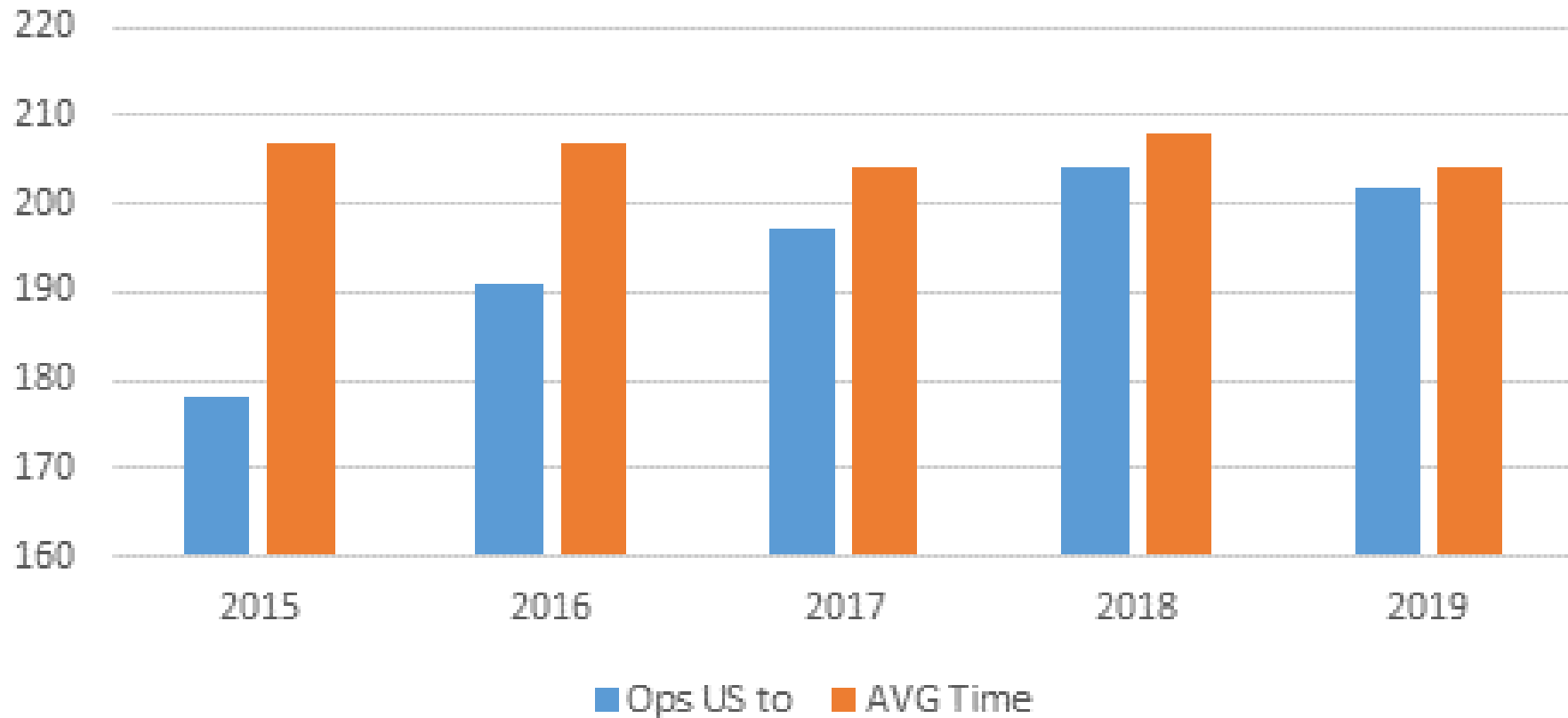


5.18 average

*Airports Council International July 2020



US to Top 10 Caribbean and Top 10 Latin American Airports



Ops in 1,000s
Time in Minutes



ASPM : City Pair Analysis : Block Time Analysis Report

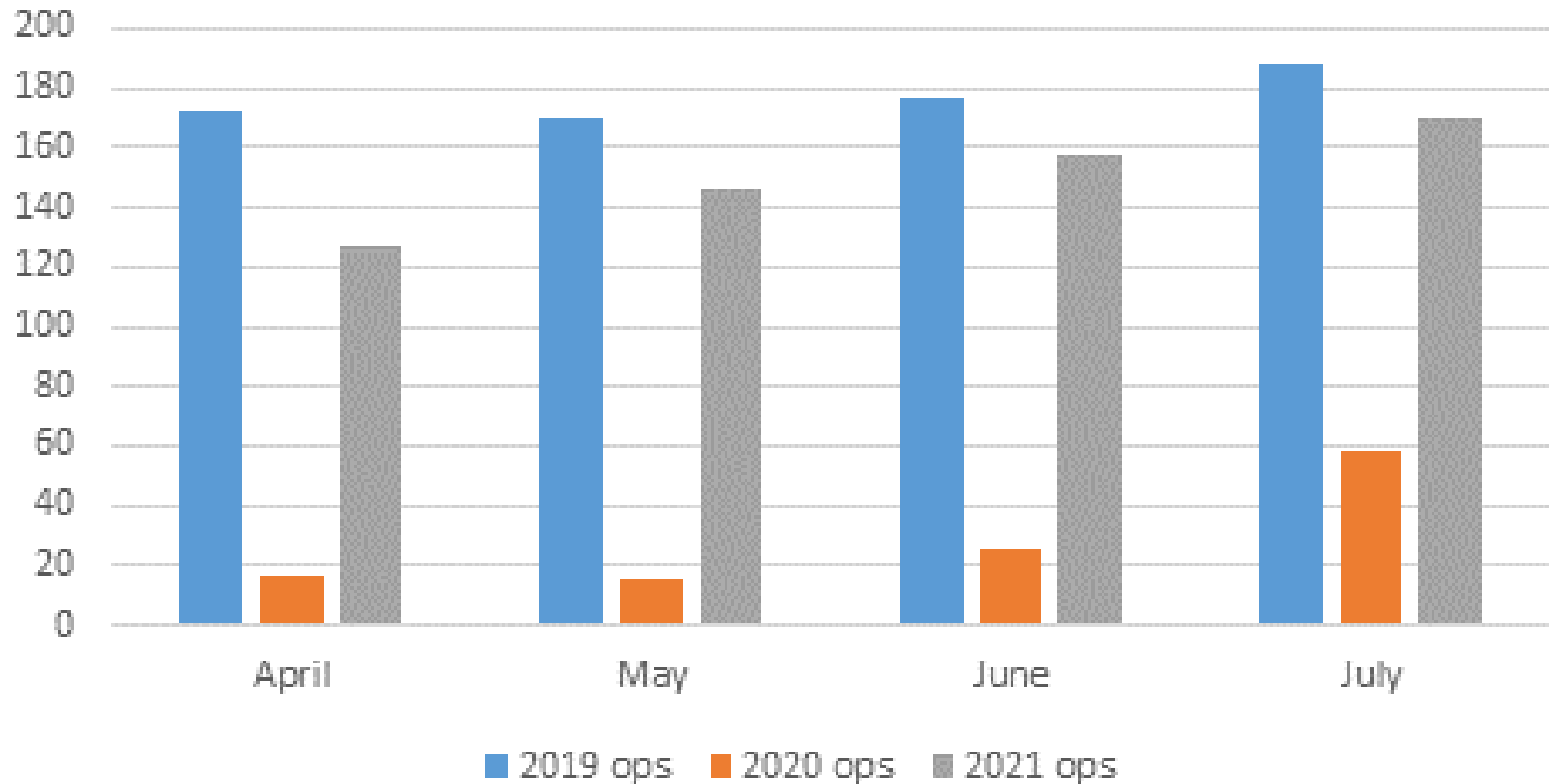
Calendar Year From 2015 To 2019 ; Departure=ABQ, ANC, ATL, AUS, BDL, BHM, BNA, BOS, BUF, BUR, BWI, CLE, CLT, CVG, DAL, DAY, DCA, DEN, DFW, DTW, EWR, FLL, GYY, HNL, HOU, HPN, IAD, IAH, IND, ISP, JAX, JFK, LAS, LAX, LGA, LGB, MCI, MCO, MDW, MEM, MHT, MIA, MKE, MSP, MSY, OAK, OGG, OMA, ONT, ORD, OXR, PBI, PDX, PHL, PHX, PIT, PSP, PVD, RDU, RFD, RSW, SAN, SAT, SDF, SEA, SFO, SJC, SJU, SLC, SMF, SNA, STL, SWF, TEB, TPA, TUS, VNY ; Arrival=SJU, MDPC, MUHA, MKJS, MYNN, MDSD, TTPP, TNCA, TFFR, TBPB, MMMX, SBGR, SKBO, MMUN, SPJC, SCEL, SBSP, SBBR, MPTO, SBGL, SAEZ : Use Flight Plan

Calendar Year	Flight Count	Average Scheduled Block Time	Average Actual Block Time	Average Block Delay	Average Taxi Out Time	Average Taxi In Time	Average Optimal Block Time	Percent On Time	Average Arrival Delay	Average Estimated Time Enroute	Average Actual Time Enroute	Average Airborne Delay
2015	179,948	241	234	3.27	18	7	227	81.03	9.68	209	207	2.38
2016	190,831	240	234	3.92	19	8	227	80.45	10.12	209	207	2.72
2017	196,649	237	232	4.08	20	8	224	80.33	9.89	206	204	2.34
2018	203,760	240	236	4.28	20	8	227	79.42	10.41	209	208	2.63
2019	201,766	236	231	3.64	19	8	223	80.83	9.68	205	204	2.51
Total :	972,954	239	233	3.85	19	8	226	80.39	9.96	208	206	2.52

Report created on Thu Aug 5 12:03:11 EDT 2021
 Sources: Aviation System Performance Metrics (ASPM)
[HTML for Excel](#) [CSV for Excel](#)

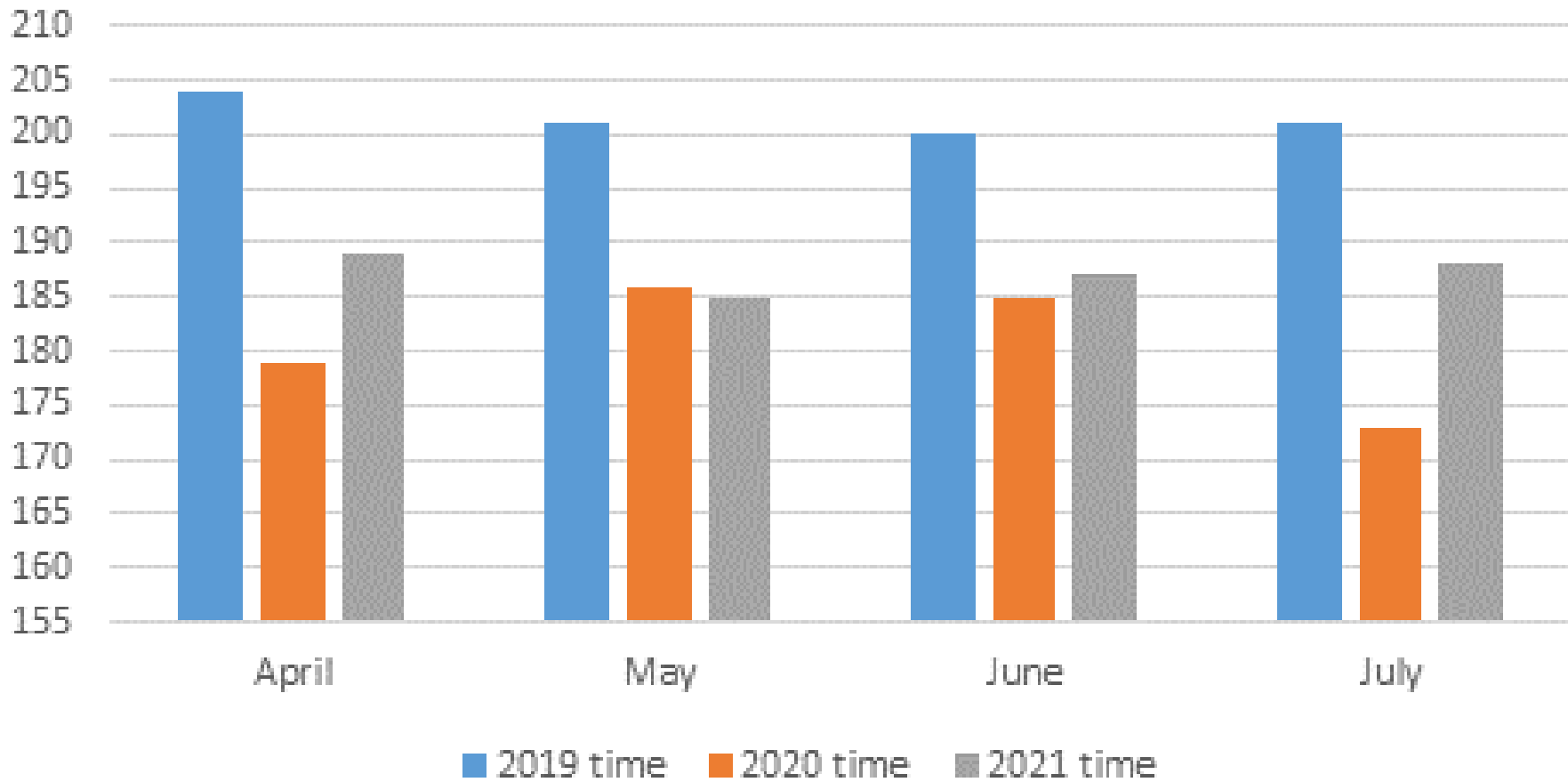


USA to Caribbean and Latin America Ops





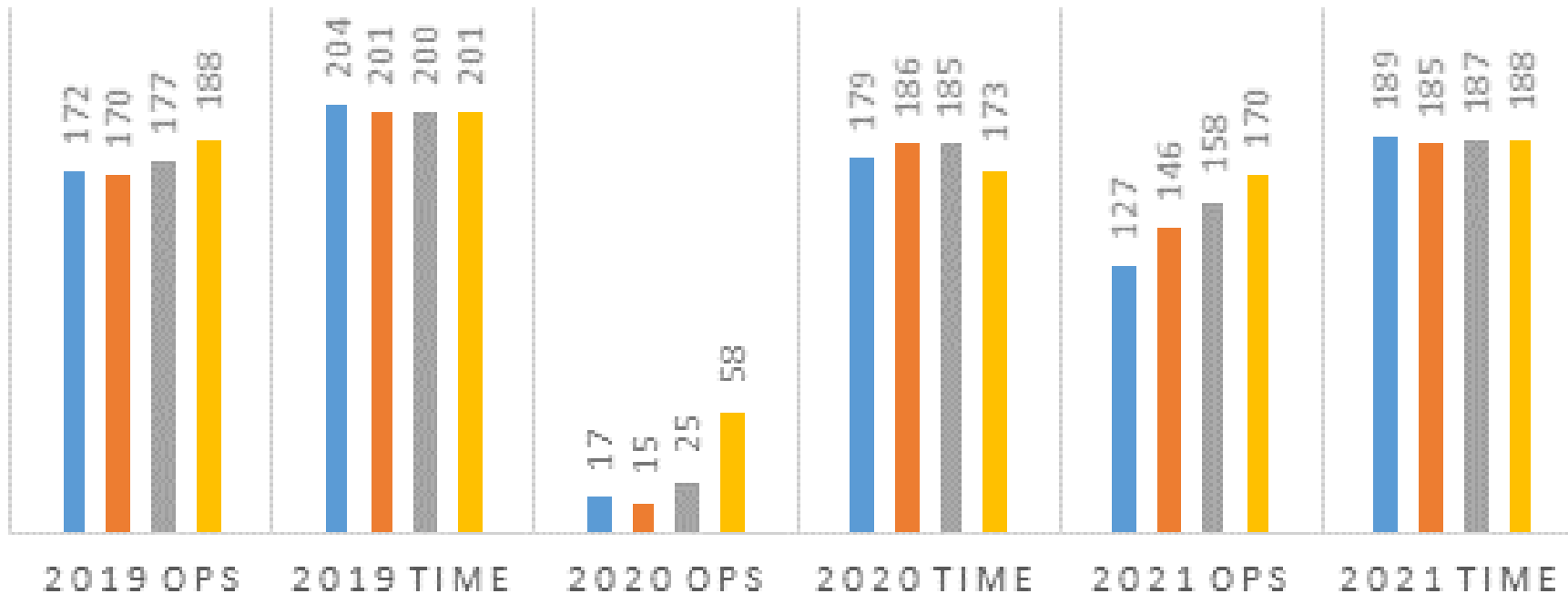
USA to Caribbean and Latin America Time





USA TO CARIBBEAN AND LATIN AMERICA

■ April ■ May ■ June ■ July



July

Ops 2021 vs 2019 = 90%

Time 2021 vs 2019 = 94%

June

Ops 2021 vs 2019 = 89%

Time 2021 vs 2019 = 94%

May

Ops 2021 vs 2019 = 86%

Time 2021 vs 2019 = 92%

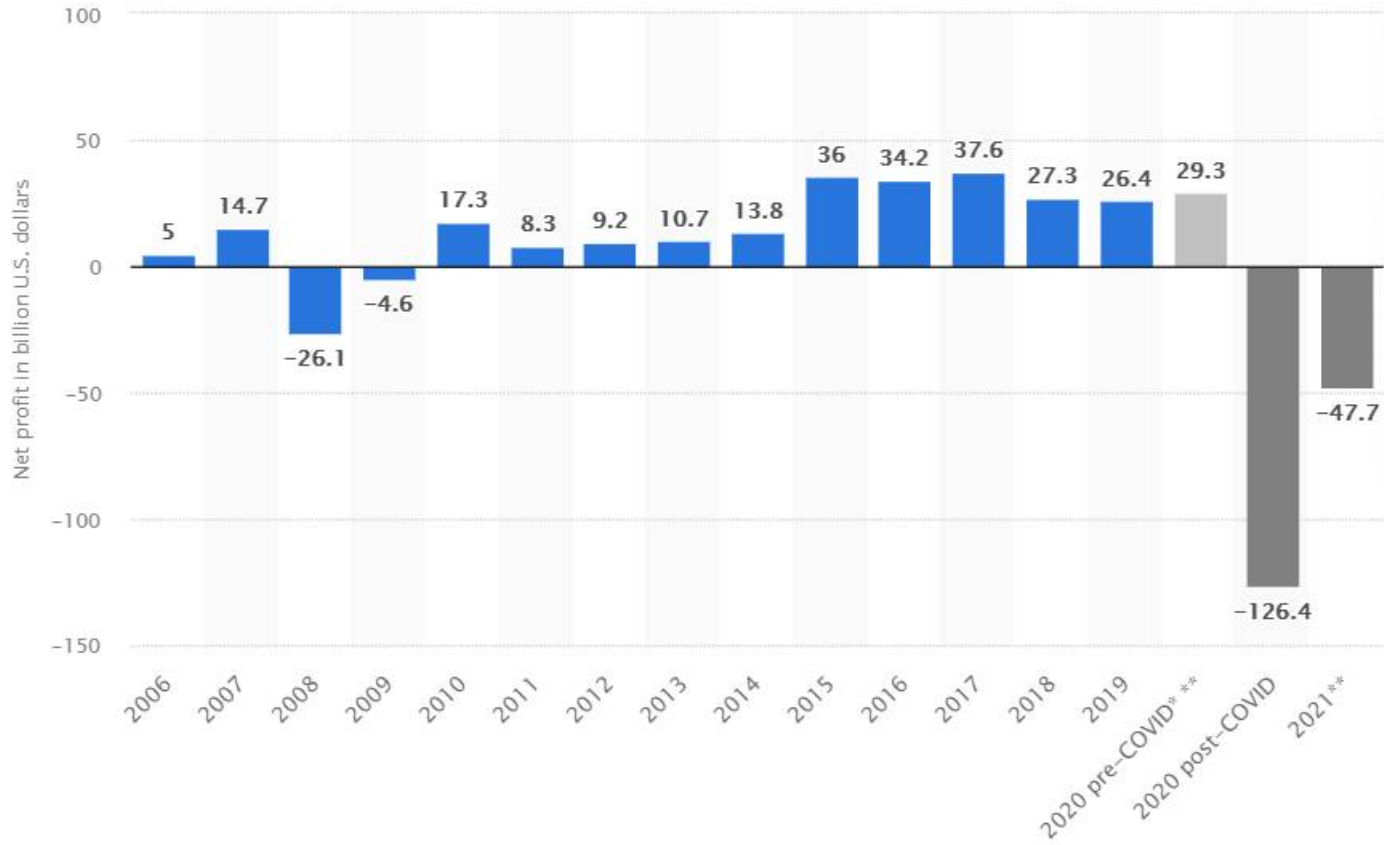
April

Ops 2021 vs 2019 = 74%

Time 2021 vs 2019 = 93%



ICAO CAPACITY & EFFICIENCY



Net profit of commercial airlines worldwide 2006-2021 IATA ICAO

Details: Worldwide; 2006 to 2020



Average estimated annual growth in passenger traffic to/from US between 2021 and 2041 and Latin America

5.7%



The estimates for U.S. airline traffic contained in the FY 2021 Aerospace Forecast document were developed between October 2020 and January 2021 and factored in the latest traffic data, economic forecasts, the status of COVID-19 infections and availability of COVID-19 vaccinations at that time. Since the completion of the analysis, subsequent data on the outlook for economic growth—which includes the effects of President Biden’s American Rescue Plan and the two prior COVID-19 relief bills, as well as current indicators of U.S. airline traffic and the rapid rate of vaccinations across the country due to the Biden-Harris Administration’s efforts—suggest a potential pace of aviation travel recovery that is faster than is depicted in the FY 2021 Aerospace Forecast. April 2021 data shows this report is likely conservative in its estimates for 2021: Flights operated in April 2021 (471,375) were more than double the flights operated in April 2020 (194,390) and 72% of the flights operated in April 2019 (652,533).

Second NAM/CAR Air Navigation
Implementation Working Group (ANI/WG)
Performance-Based Navigation (PBN)
Implementation Task Force Meeting
(ANI/WG/PBN/TF/2) /
Segunda Reunión del Grupo de Tarea de
Navegación Basada en la Performance del
Grupo de Trabajo sobre implementación de
Navegación Aérea para las Regiones
NAM/CAR (ANI/WG/PBN/TF/2)

10 to 12 August 2021 / 10 al 12 de Agosto de
2021



ICAO



OAC

We will be right back...
Regresamos en unos minutos...



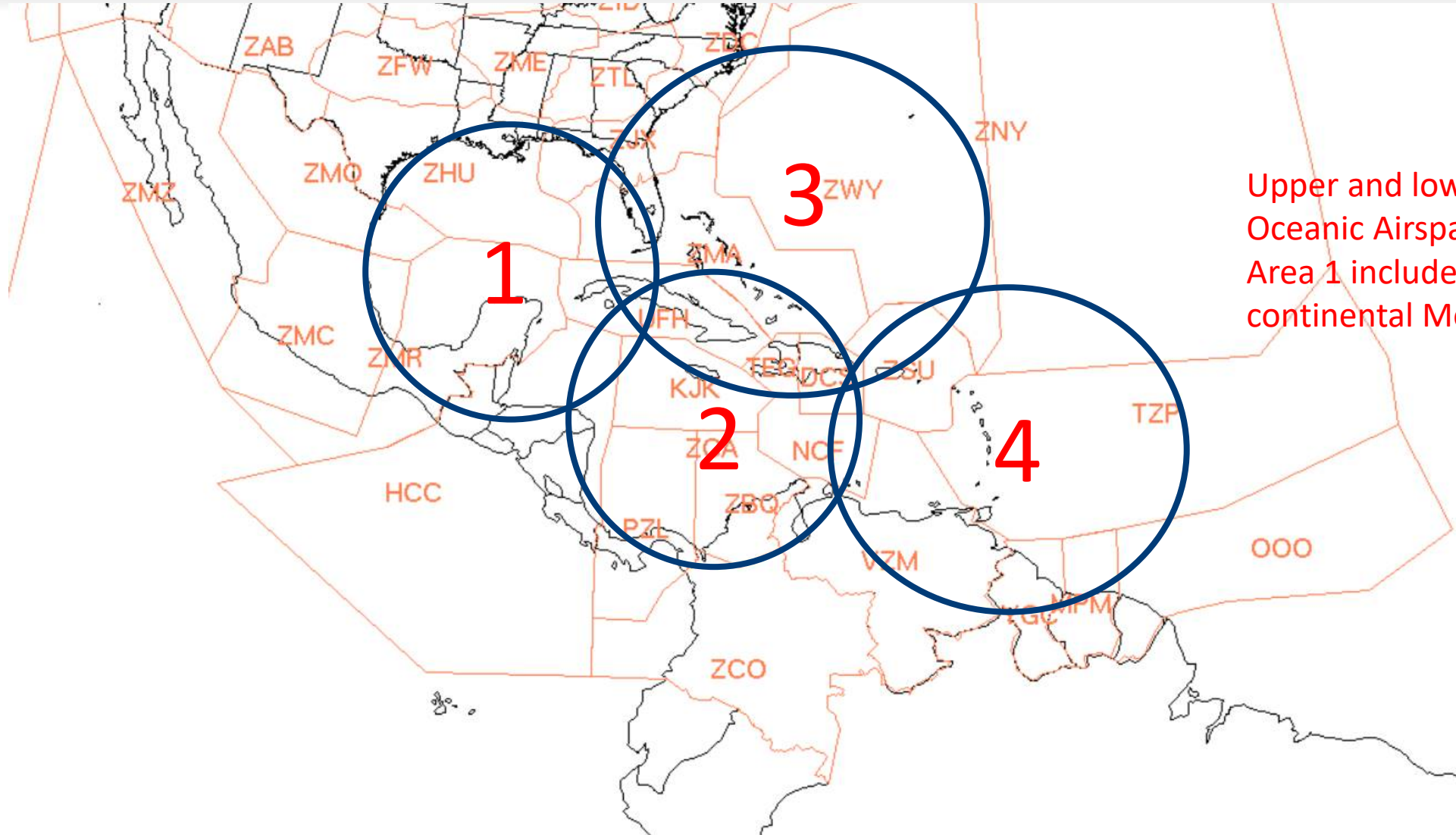
Objectives

- ✈ Redesign CAR Airspace to meet growing demand
- ✈ Operational Improvements
- ✈ Gain Efficiency
- ✈ Lower Carbon Footprint
- ✈ Interoperable/ harmonized with adjacent Regions
- ✈ Long Term Solution
- ✈ Implementation time: 2-3 years

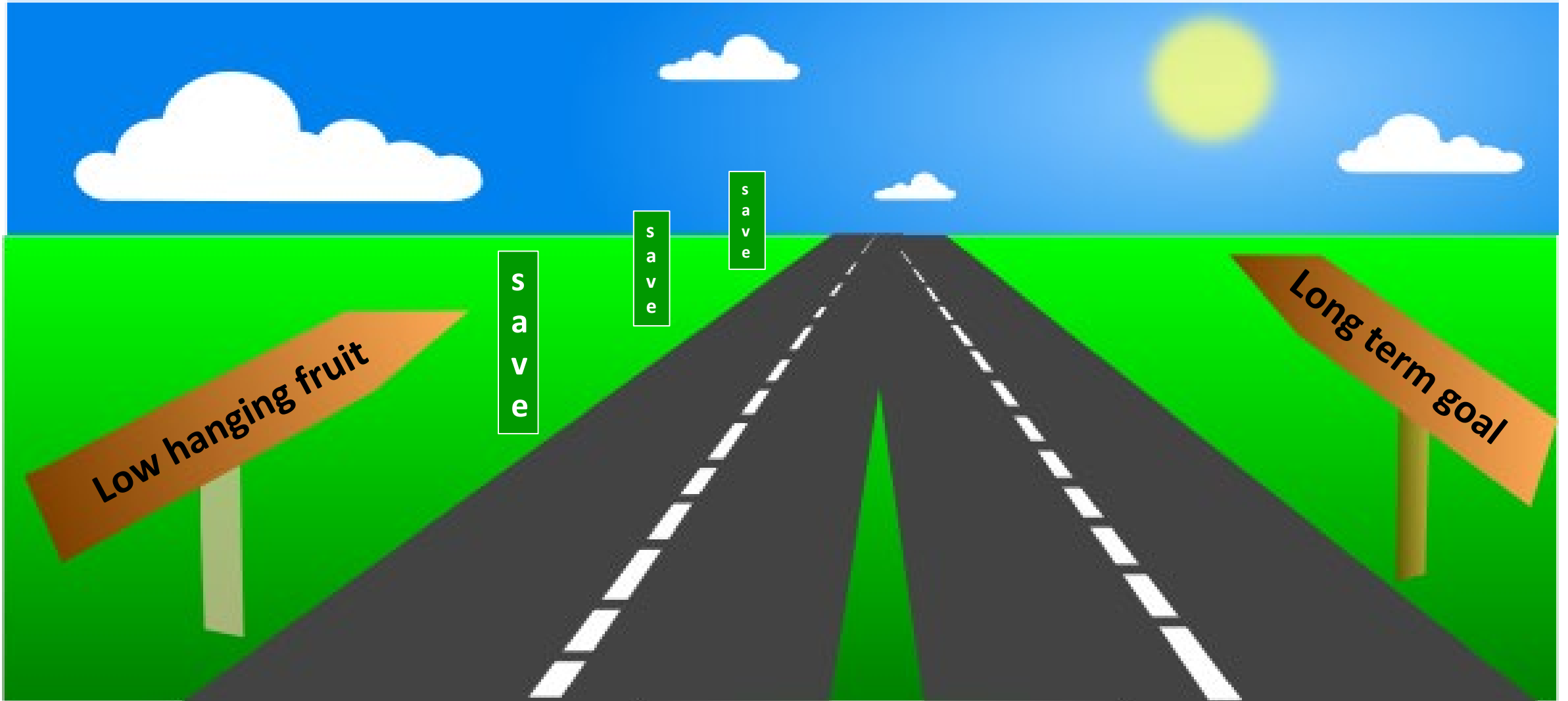


Strategy

- ✈ Communication component -strategy
 - ✈ Letter Stating Mission
 - ✈ Reporting to DG and Technical AN Implementation Groups
- ✈ Working Methodology:
 - ✈ Gather POC SME from each State
 - ✈ Gather POC/POCs from the user community
 - ✈ Work by groups on sections of airspace
 - ✈ Metrics and indicators
- ✈ ATM Improvement concepts- GANP related: PBN, CCO, CDOs, ASBU B1?

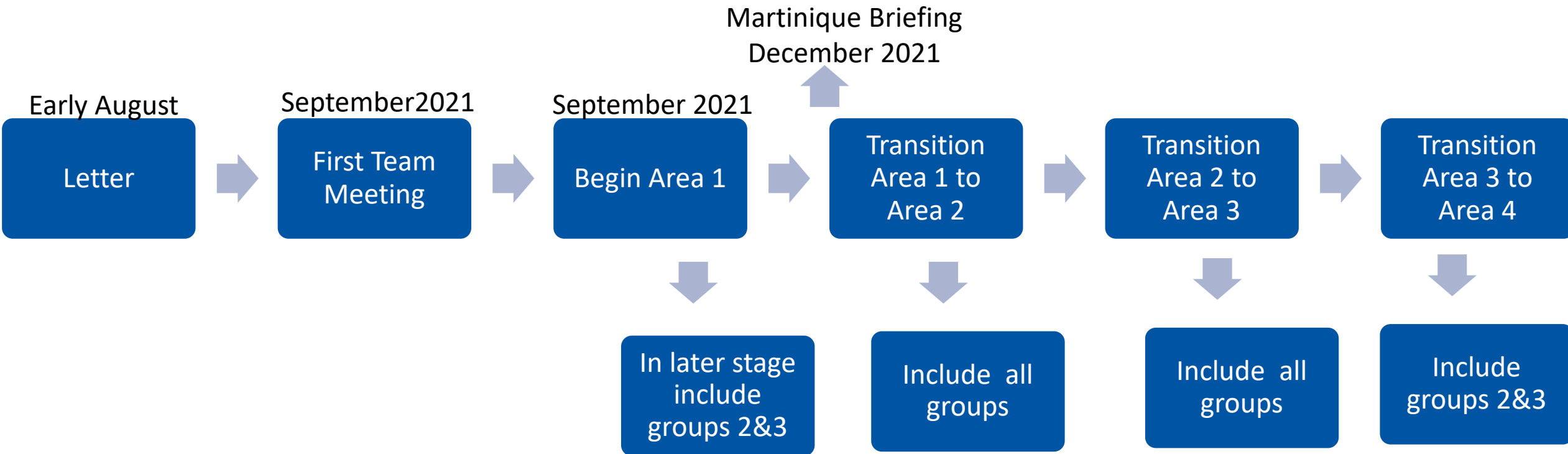


Upper and lower FIRs?
Oceanic Airspace?
Area 1 includes all continental Mexico?





Proposed Timeline





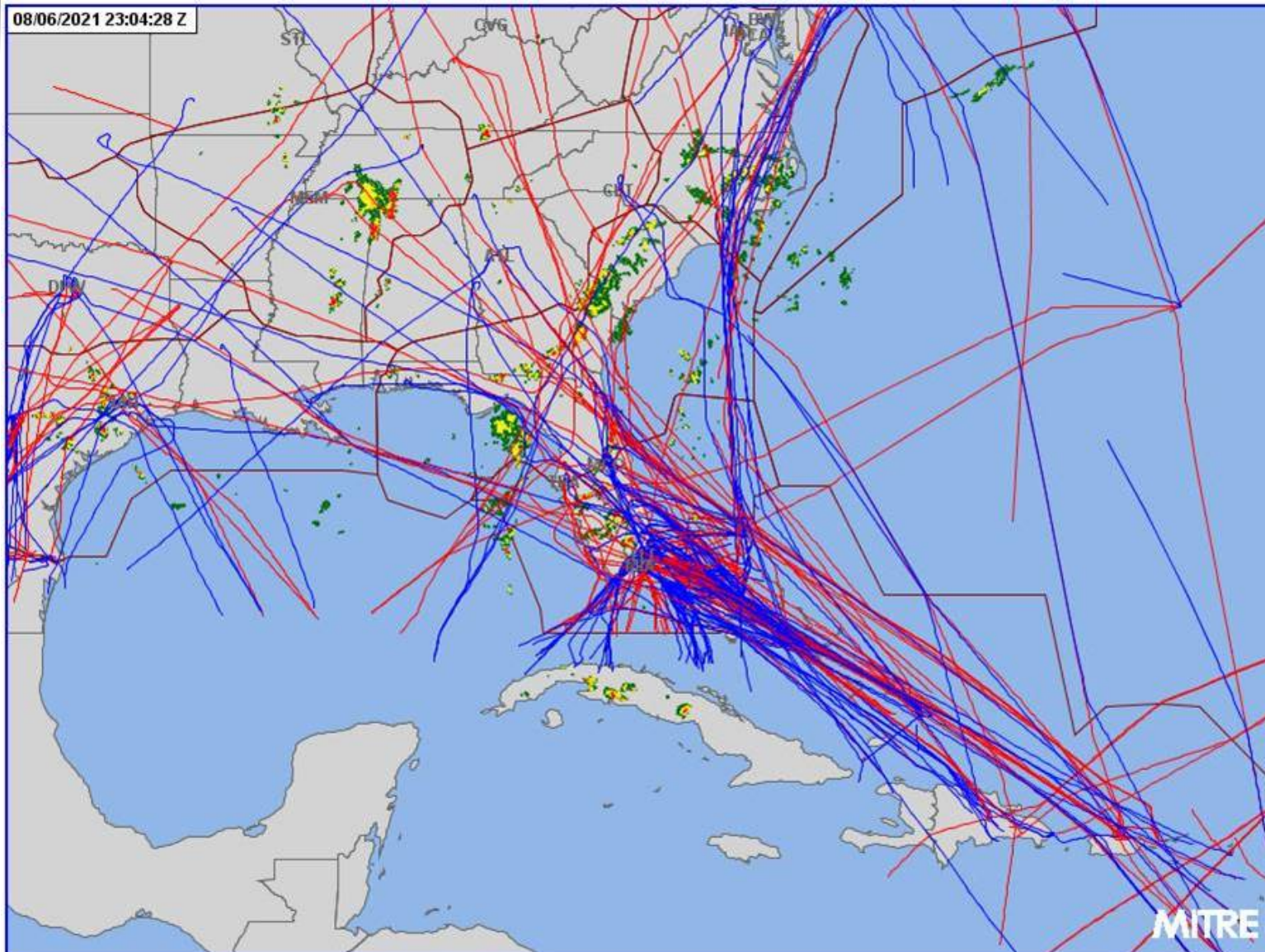
Measuring Success

✈ Implement change

✈ Compare results with previously measured data



ICAO CAPACITY & EFFICIENCY





ICAO CAPACITY & EFFICIENCY





ATL-MDPC

- ✈ 2015-2019 3.7 flights/day averaging 174 minutes
- ✈ First 2 months of new route averaging 172.5 minutes
- ✈ 33.7 hours saved in 1 year = 11.6 free flights



MIA-SBGR

- ✈ 2015-2019 4.9 flights/day averaging 465 minutes
- ✈ First 2 months of new route averaging 463 minutes
- ✈ 59.6 hours saved in 1 year = 7.7 free flights



Questions?



ICAO CAPACITY & EFFICIENCY



THANK YOU!