Air Traffic
BY THE **NUMBERS**

Federal Aviation Administration

FAA Contributors to ATO By the Numbers

- **Air Traffic Organization (ATO)**
    - **AJR - System Operations**
        - **AJR-G Performance Analysis**
        - **AJR-B Flight Service**
    - **AJI - Safety and Technical Training Services**
        - **AJI-3 Policy and Performance**
    - **AJM – Program Management Organization**
        - **AJM-33 Aviation Weather & Aero Services**
    - **AJT – Air Traffic Services**
- **Non-ATO**
    - **AOC – Office of Communications**
    - **ABP-230 – Data Analysis and Reporting Services Branch**
    - **APO – Aviation Policy & Plans**
    - **AST – Office of Commercial Space Transportation**
    - **AVS – Aviation Safety**

Data Sources

Database Name	Owned/Managed by
Aviation System Performance Metrics (ASPM)	AJR-G
Operations Systems Network (OPSNET)	AJR-G and AJW
National Traffic Management Log (NTML)	AJR-G and AJW
Traffic Flight Management System (TFMS)	AJR-G (archives) and AJW
National Offload Program (NOP)	AJR-G (archives) and AIT
U.S. Civil Airmen Statistics	APO
Runway Incursion Data	AVS
BTS T-100 Market and Segment Data	Bureau of Transportation Statistics

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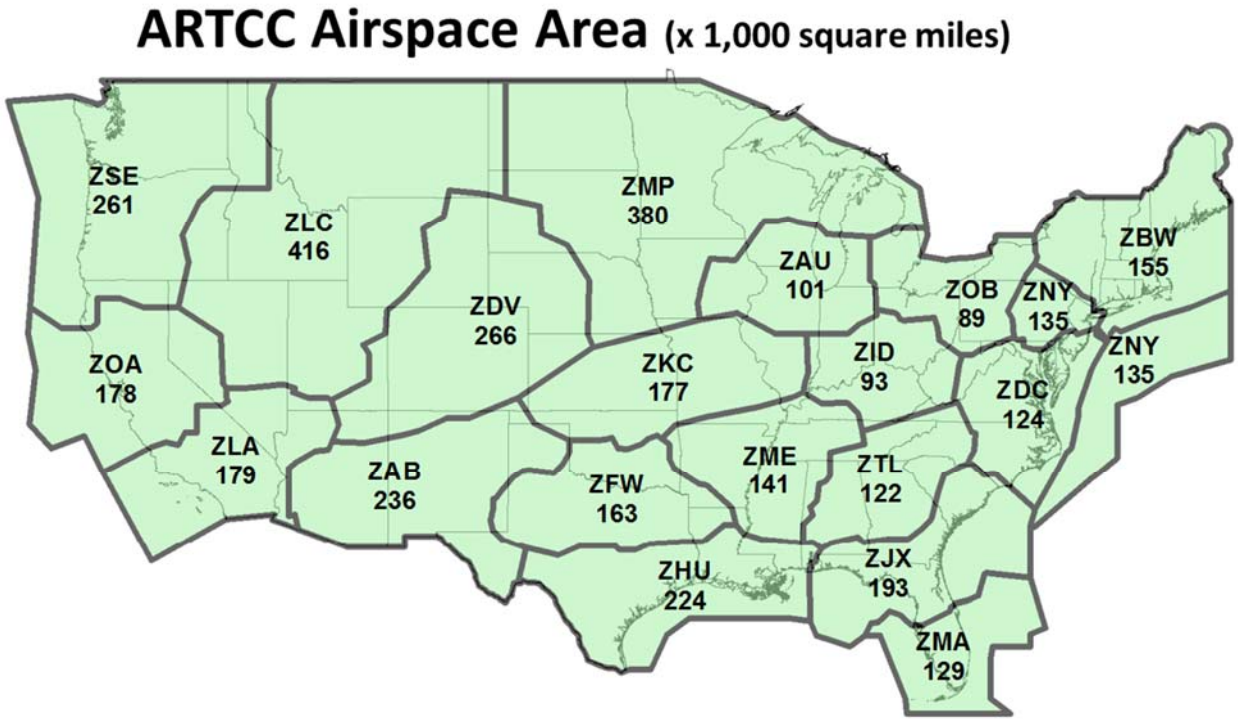
Air Traffic Organization Leadership

www.faa.gov/about/office_org/headquarters_offices/ato/leadership



Air Traffic Management System Overview for FY2017

ATO Program and Financing Operations Budget Estimate (in $billions)	**$7.6**
Flights Handled	
Scheduled	9,869,000
Unscheduled	5,932,000
Total	**15,801,000**
Airspace (in millions of sq mi)	
Oceanic	24.1
Domestic	5.3
Total	**29.4**
Airports	
Public Airports	4,898
Private Airports	14,448
Total	**19,346**
ATC Towers	
Federal	264
Contract	253
Total	**517**
TRACONs	
Stand-Alone	25
Combined ATC Towers	130
Total	**155**
En Route Centers & CCFs	
ARTCC	21
CCF	4
Total	**25**
NAVAIDS	**13,236**
Alaska Weather Cameras	**235**
Controllers	**14,481**
GA Aircraft (CY2016)	
Fixed Wing	166,200
Rotorcraft	10,600
Experimental/Lightcraft/Other	35,000
Total	**211,800**
GA Flight Hours	**24,833,000**

Sources:

ATO Program and Financing: U.S. Dept. of Transportation, Budget Estimates: FY2019, Federal Aviation Administration.

Flights Handled: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, February 8, 2018.

Airspace: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration.

Airports and **NAVAIDS**: Office of Communications (AOC), Federal Aviation Administration, Administrator's Fact Book, April 2018. https://www.faa.gov/news/media/2018_Administrators_Fact_Book.pdf

ATC Towers and **En Route Centers & CCFs**: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Operations Network (OPSNET), Facility Information.

TRACONs: Air Traffic Services (AJT), Air Traffic Organization, Federal Aviation Administration, Terminal Radar Approach Control Facilities (TRACON), March 30, 2016. https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/air_traffic_services/tracon/; Air Traffic Services (AJT), Email communication, April 17,2018.

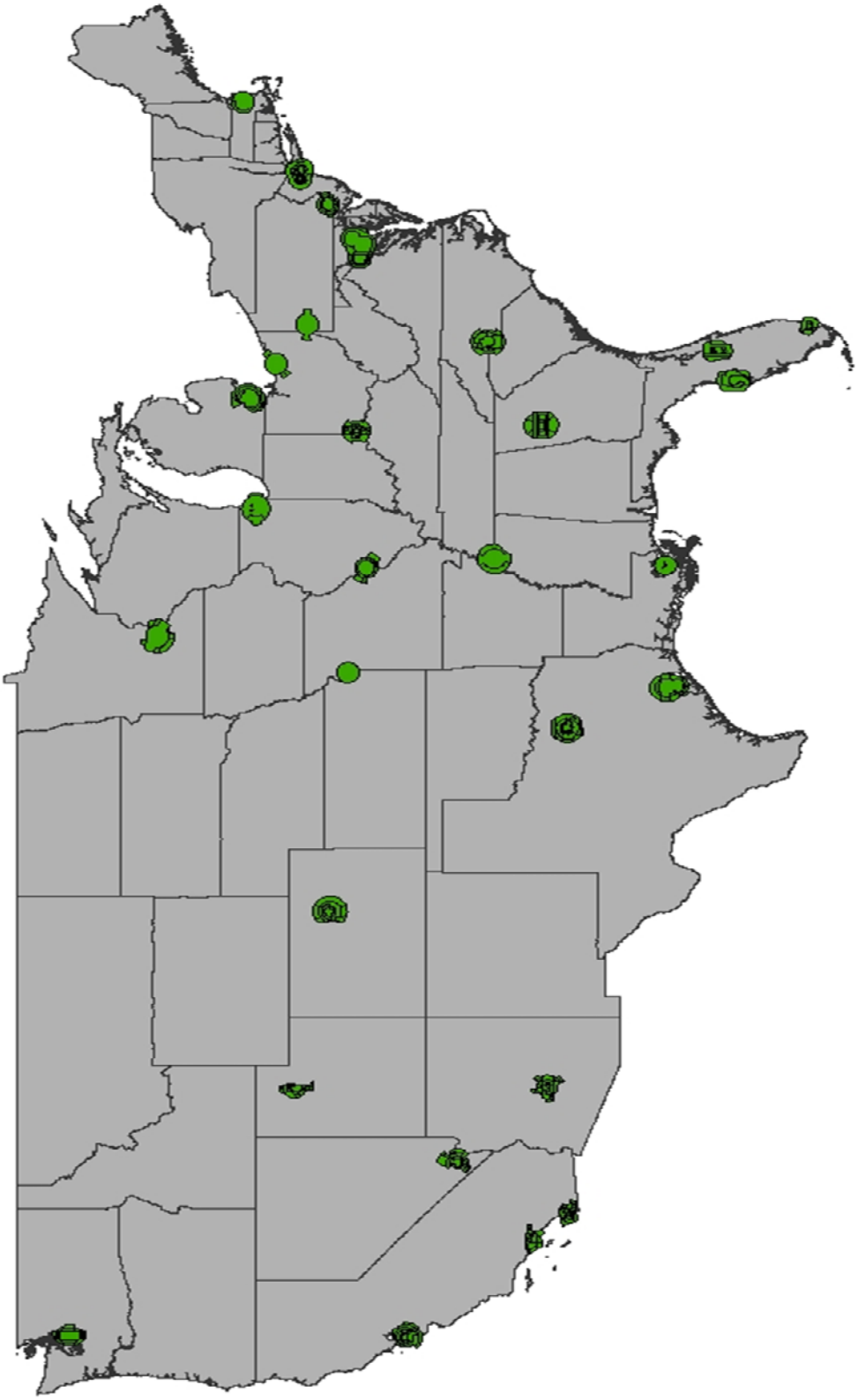
Alaska Weather Cameras: Aviation Weather & Aeronautical Services (AJM-33), Air Traffic Organization, Federal Aviation Administration, FAA Aviation Weather Cameras, accessed March 7, 2018. https://avcams.faa.gov/sitelist.php

Controllers: Data Analysis and Reporting Services Branch (ABP-230), Office of Finance and Management, Federal Aviation Administration, Air Traffic Controller and Academy Movement Report - September FY2017, September 16, 2017.

GA Aircraft and **GA Flight Hours**: Federal Aviation Administration, General Aviation and Part 135 Activity Surveys – CY2016. https://www.faa.gov/data_research/aviation_data_statistics/general_aviation/

Class B Airspaces (Airspace around Busiest US Airports)

Note: Airspaces accurately represented for coverage area

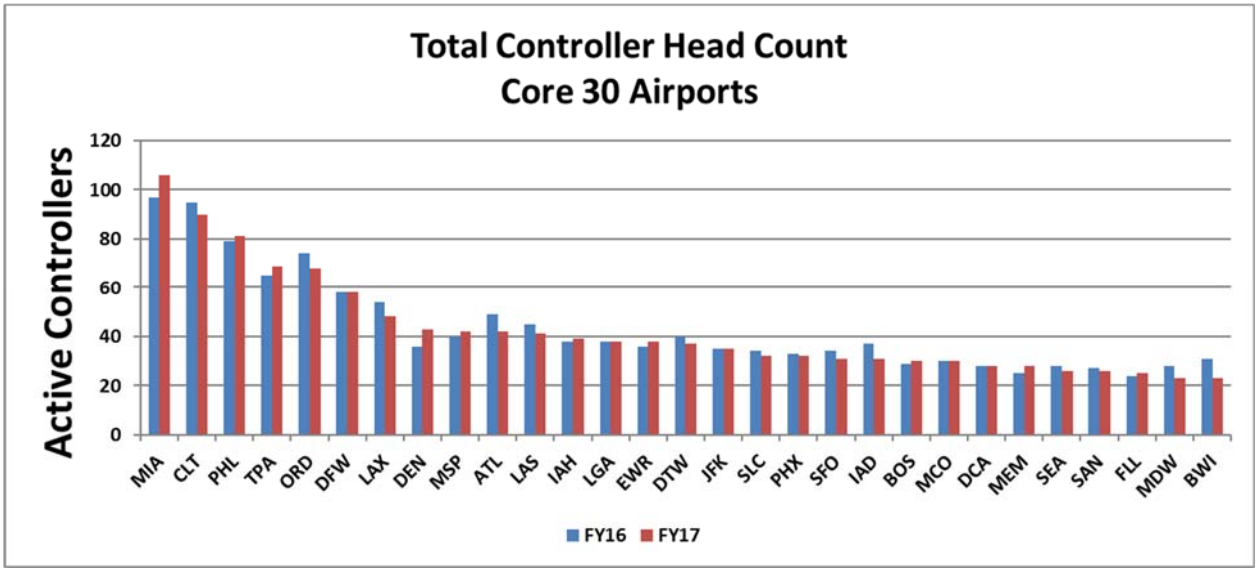


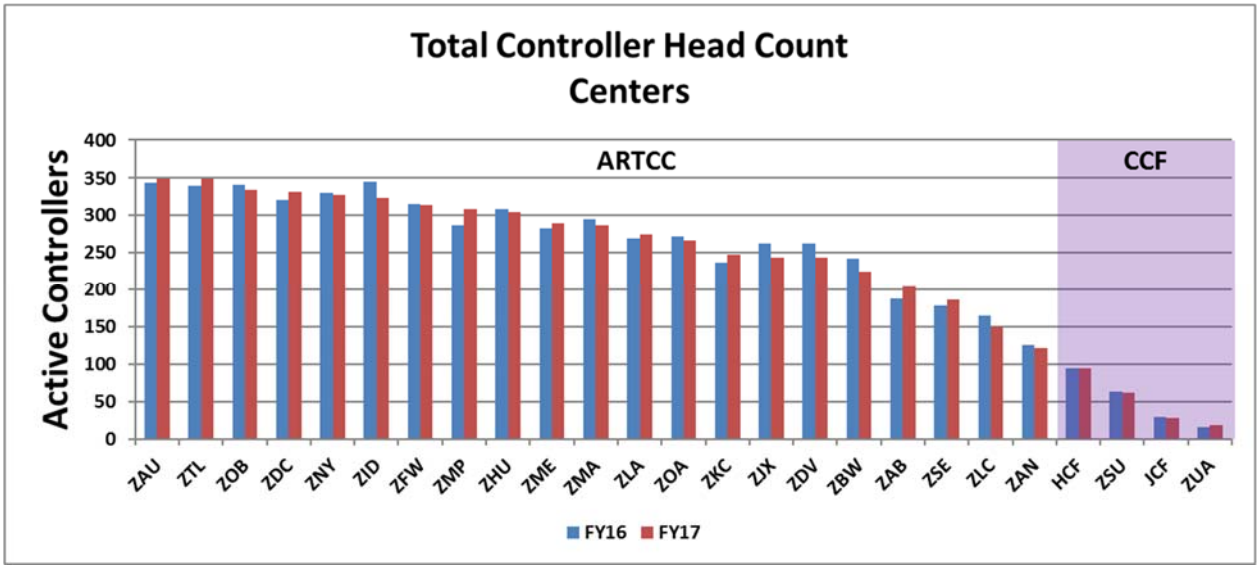
Air Traffic Controllers

In FY2017, the number of air traffic controllers rose by 32, from 14,449 to 14,481.

	FY2016	FY2017
Academy Graduate (AG)	878	883
Developmental (D1)	176	204
Developmental (D2)	622	640
Developmental (D3)	496	533
Certified Professional (CPC)	10,619	10,544
Certified Professional in training (CPCIT)	1,259	1,205
Controllers	**14,050**	**14,009**
Academy	**399**	**472**
Total Head Count	**14,449**	**14,481**

At Core 30 airports, Miami (MIA), Charlotte (CLT), Philadelphia (PHL), and Tampa (TPA), report large head counts because these are combined ATCT TRACONs. MIA had the highest net gain of controllers at nine, while BWI had the highest net loss at eight. (*See*, Appendix I for explanations of the Core 30 airport and Air Route Traffic Control Center codes.)





Source: Data Analysis and Reporting Services Branch (ABP-230), Office of Finance and Management, Federal Aviation Administration, Air Traffic Controller and Academy Movement Report - September FY2017, October 16, 2017.

Pilot Certificates

ESTIMATED ACTIVE PILOT CERTIFICATES HELD
BY CATEGORY AND AGE GROUP OF HOLDER
as of December 31, 2017

Age Group	Type of Pilot Certificates							Flight Instructor 2/	Remote Pilot 2/
	Total	Student	Sport	Recre-ational	Private 1/	Commercial 1/	Airline Transport 1/	CFI 3/	
Total	**609,305**	**149,121**	**6,097**	**157**	**174,516**	**114,186**	**165,228**	**106,692**	**69,166**
14-15	317	317	0	0	0	0	0	0	0
16-19	17,350	13,448	17	1	3,602	282	0	63	990
20-24	61,034	34,107	116	12	15,035	10,862	902	4,144	5,087
25-29	67,901	31,366	175	22	13,250	17,597	5,491	8,037	8,591
30-34	57,885	20,867	265	12	12,980	12,078	11,683	11,755	9,743
35-39	53,294	14,666	258	7	12,282	9,397	16,684	12,480	8,964
40-44	46,771	8,664	283	11	12,062	7,570	18,181	10,841	7,598
45-49	49,362	6,797	418	12	12,747	7,445	21,943	11,695	7,309
50-54	55,746	6,082	655	12	15,780	7,956	25,261	10,756	6,437
55-59	59,930	5,068	878	11	19,938	8,799	25,236	9,823	5,603
60-64	54,309	3,564	1,064	20	21,246	9,239	19,176	8,936	4,474
65-69	37,879	2,255	829	18	16,442	8,317	10,018	7,362	2,614
70-74	26,444	1,256	639	11	10,899	7,508	6,131	6,026	1,308
75-79	12,967	457	337	6	5,226	4,118	2,823	2,952	347
80 and over	8,116	207	163	2	3,027	3,018	1,699	1,822	101

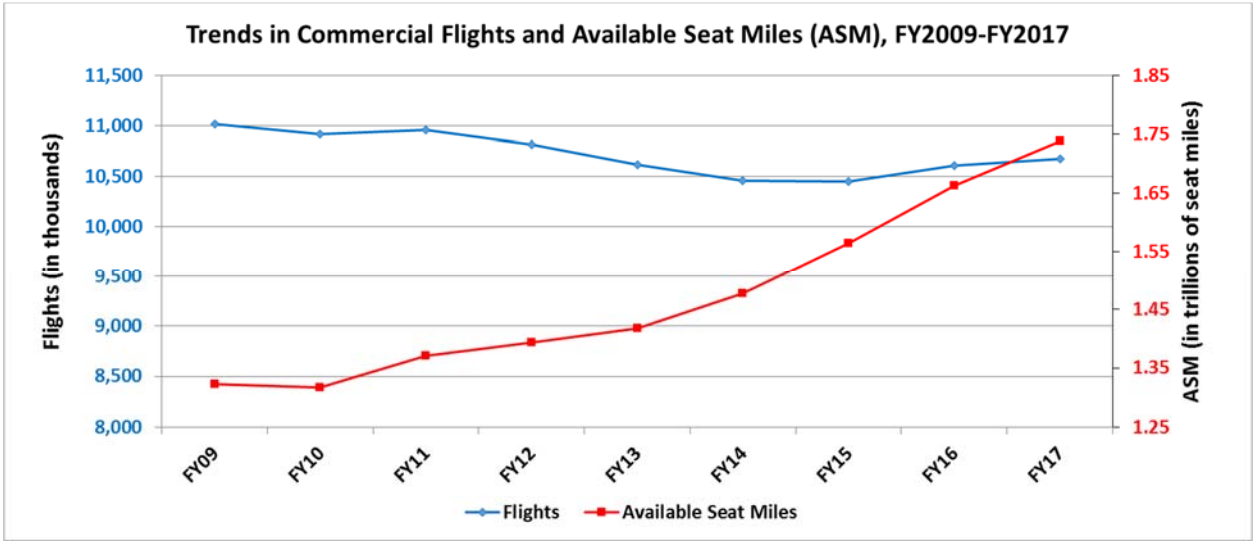
1/ Includes pilots with an airplane and/or a helicopter and/or a glider and/or a gyroplane certificate. Pilots with multiple ratings will be reported under highest rating. For example a pilot with a private helicopter and commercial airplane certificates will be reported in the commercial category.
2/ Not included in total active pilots.
3/ Certified Flight Instructor

Source: Office of Aviation Policy and Plans (APO), Federal Aviation Administration, U.S. Civil Airmen Statistics, 2017, Table 12. https://www.faa.gov/data_research/aviation_data_statistics/civil_airmen_statistics/

Commercial Flight and Available Seat Mile (ASM) Trends

Since FY2009, there has been a reduction in scheduled commercial flights but an increase in available seat miles (ASMs). ASMs are a measure of passenger capacity by air carriers. It is computed by multiplying the number of seats on an aircraft by the stage length of the flight.

In recent years, airlines have reduced the number of smaller aircraft and increased operations of larger aircraft. Also, the average stage length has increased. Both these factors increase total passenger capacity. Over FY2009-FY2017, data from the Bureau of Transportation Statistics show the number of commercial flights fell by 3.1 percent to 10.7 million in FY2017, but the number of passengers rose by 22.4 percent to 971.6 million, reflecting impacts of rising load factors and aircraft size. During the same period, RPM and ASM rose by 37.4 and 31.6 percent, respectively, indicating rising stage lengths and load factors. The table below shows passenger statistics for the two most recent fiscal years.



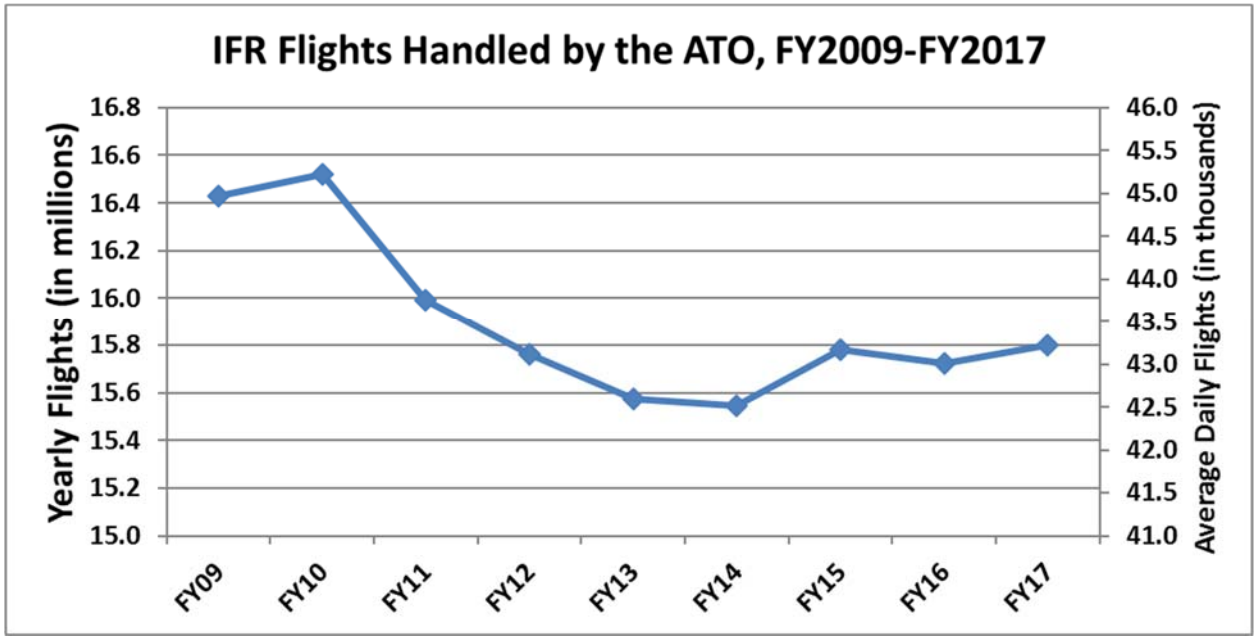
Source: Bureau of Transportation Statistics, U.S. Dept. of Transportation, T100 Segment Data, March 30, 2018.

Passenger Statistics		
	FY2016	**FY2017**
Yearly Passengers	942,111,092	971,595,898
Average Daily Passengers	2,574,074	2,661,907
Revenue Passenger Miles (trillions)	1.37	1.43
Available Seat Miles (trillions)	1.66	1.74
Passenger Load Factor (%)	82.13%	82.14%

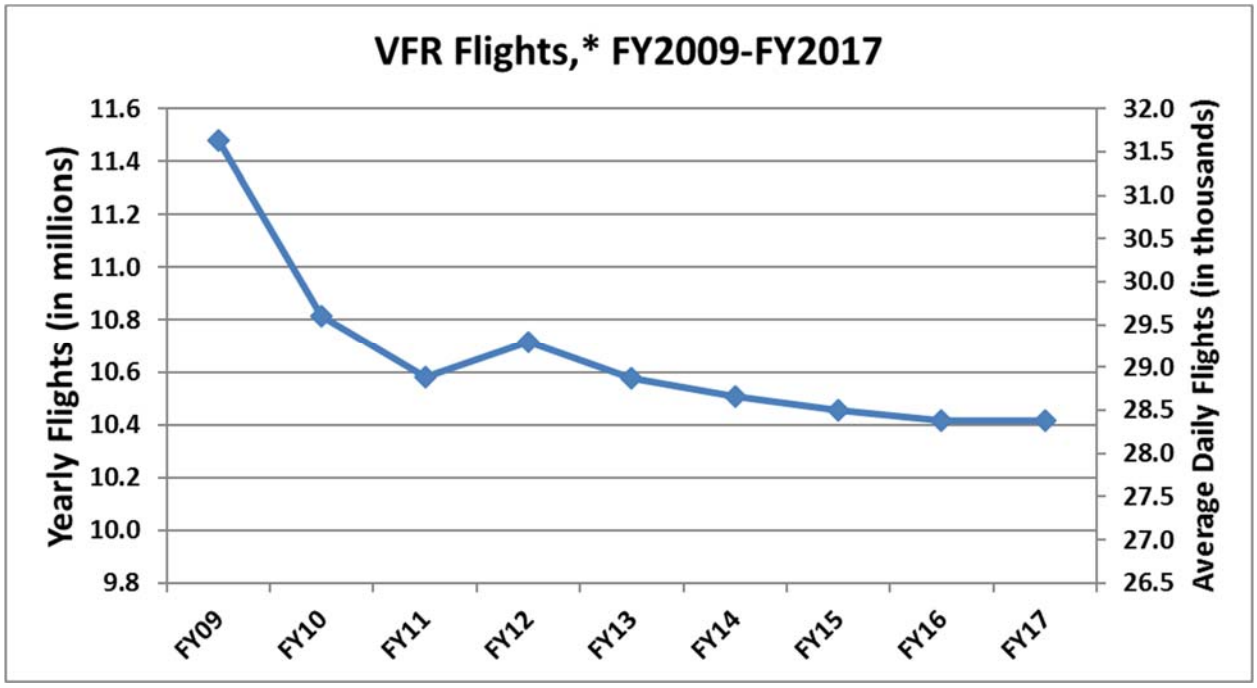
Economic Impact of Civil Aviation		
	CY2013	**CY2014**
Aviation in US generates # jobs	10,139,000	10,589,000
Earnings of (billions)	$427.00	$446.80
Aviation contributes annually (trillions)	$1.55	$1.62
Constitutes % of GDP	5.1%	5.1%

Sources: Bureau of Transportation Statistics, U.S. Dept. of Transportation, T100 Segment Data, March 30, 2018; Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Economic Impact of Civil Aviation on the U.S. Economy, November 2016. https://www.faa.gov/air_traffic/publications/media/2016-economic-impact-report_FINAL.pdf

Instrument Flight Rule (IFR) and Visual Flight Rule (VFR) Flights across the NAS*



Office of Performance Analysis (AJR-G) data show the number of IFR flights rose slightly in FY2017, while the number of VFR flights remained virtually unchanged. As the two accompanying graphs attest, the numbers of IFR and VFR flights fell since the end of the recession. The use of larger aircraft, longer stage lengths, and higher fuel costs also contributed to the reduction in flights. Note that a slow recovery in IFR operations began in FY2014. (Note, the total number of flights also appears in Appendix II.)



*Note: OPSNET reports VFR activity as total operations (arrivals + departures). Total VFR flights are approximated by dividing total operations by 2.

The frequency of VFR flights dropped dramatically in the wake of the Great Recession. After a slight increase in FY2012, VFR flight activity has continued to decrease through FY2017. Since FY2009, the number of VFR flights fell 9.3 percent; since 2012, these flights fell 2.8 percent.

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, FAA, February 8, 2018.

Demand and Efficiency in the NAS

The NAS is composed of 517 airport towers, 155 Terminal Radar Control (TRACON) facilities (25 Stand-Alone and 130 Combined ATCT), and 25 Control Centers (21 Air Route Traffic Control Centers (ARTCC) and 4 Combined Control Facilities (CCF)).

TRACONs handle descending flights received from a Center or ascending flights received from an ATC tower (see figure below). Of the 155 TRACONs in the NAS, 130 of them are Combined such that the TRACON exists in the same location as the ATC tower. Such facilities include Miami, Charlotte, and El Paso Towers.

Centers handle all en route flights operating on Instrument Flight Rule (IFR) flight plans. Centers receive flights from or hand off flights to other Centers throughout the flight's en route phase of operation. They also receive flights or hand off flights to TRACONs when flights enter or exit the en route phase of operation.

The report reveals the demand observed at some of the busiest facilities which include 30 airport towers (known as the Core 30), 22 TRACONs, and all 25 Centers (which include 4 CCFs). Efficiency is also reported based on the following metrics:

Number of Flights at Any Given Minute

Average Hourly Capacity

Average Daily Capacity

Average Number of Level-Offs

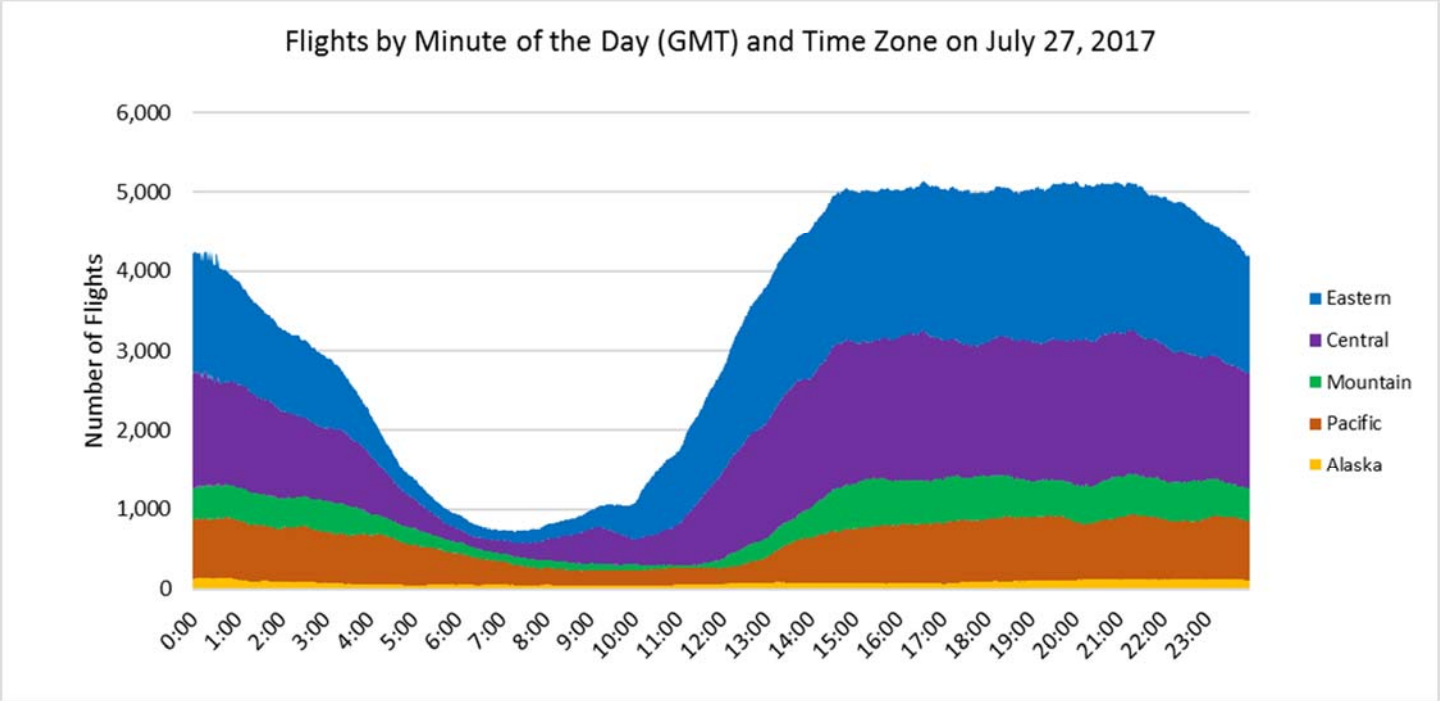
Average Level Flight Distance from TOD to Arrival

Number of IFR Flights at Any Given Minute during Peak Operational Times

5,000 Flights

Traffic Flow Management System (TFMS) flight data were used to estimate the number of flights en route by every minute of the day and by U.S. time zone on July 27, 2017. Peak operational times in the NAS range between 1500 GMT and 2200 GMT. During peak operational times in the NAS on that day, there were approximately **5,000** flights en route in the NAS every minute.

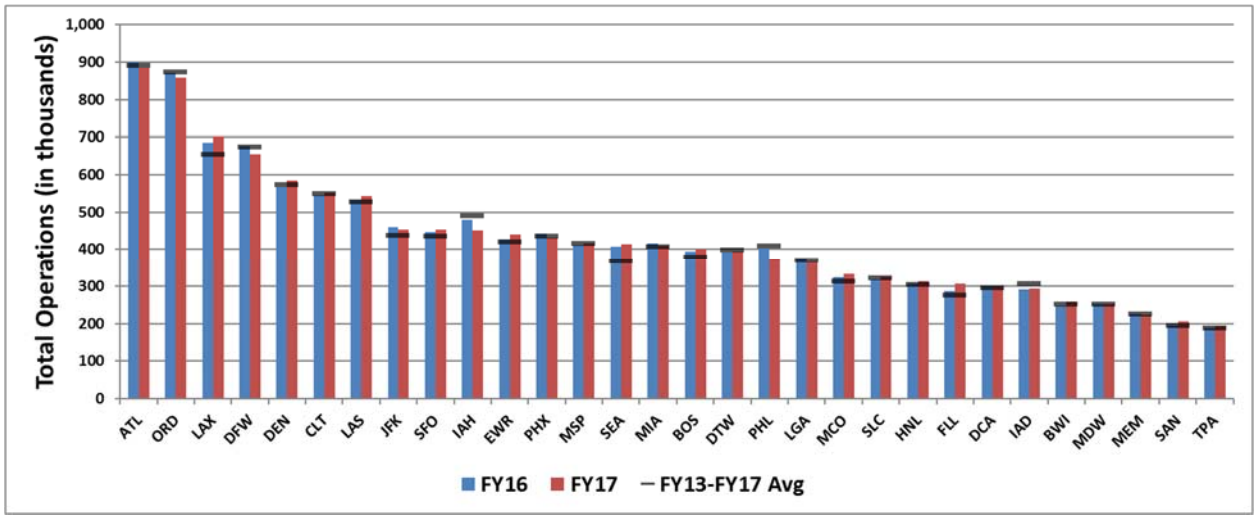
The figure below shows the average number of flights en route per minute and flights under air traffic control within a time zone. The Eastern Time Zone has the largest share of flights in the NAS on average and, in this analysis, also includes flights under air traffic control from Puerto Rico and Bermuda. The Pacific Time Zone category includes all west coast air traffic as well as oceanic operations controlled by Oakland Center (ZOA), including Hawaii and Guam.



Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Traffic Flow Management System (TFMS), March 14, 2018.

Core 30 Airport Tower Operations

Airport operations are the sum of the number of airport arrivals and departures. Airport traffic controllers handle such operations. Each flight has a departure and arrival, meaning each flight has two airport operations. In FY2017, Core 30 airport operation numbers from OPSNET rose by 0.1 percent, from 12,771,000 to 12,782,513. Below are airport tower operations for each Core 30 airport for FY2016 and FY2017. Atlanta (ATL), Chicago O'Hare (ORD), and Los Angeles (LAX) experienced the highest number of operations, each with operations above 700,000. Operations at ATL and ORD fell slightly, while operations at LAX rose. (*See*, Appendix I for explanations of the Core 30 airport codes.)



Total Core 30 Airport Operations			
FY13-17 Avg	**FY16**	**FY17**	**%Change**
12,641,792	12,771,000	12,782,513	0.1%

Airport	Rank*	FY13-17 Avg	FY16	FY17
ATL	**1**	890,187	899,040	884,734
BOS	**16**	379,489	394,817	400,740
BWI	**26**	251,544	247,576	257,525
CLT	**6**	549,183	545,894	552,055
DCA	**24**	295,335	299,899	298,125
DEN	**5**	574,678	566,035	584,240
DFW	**4**	673,440	676,890	655,525
DTW	**17**	398,355	392,383	393,713
EWR	**11**	420,450	427,796	441,039
FLL	**23**	275,875	287,264	305,531
HNL	**22**	304,951	307,537	312,300
IAD	**25**	307,439	291,475	293,860
IAH	**10**	489,462	479,778	452,158
JFK	**8**	438,008	458,830	454,199
LAS	**7**	528,326	532,979	543,665

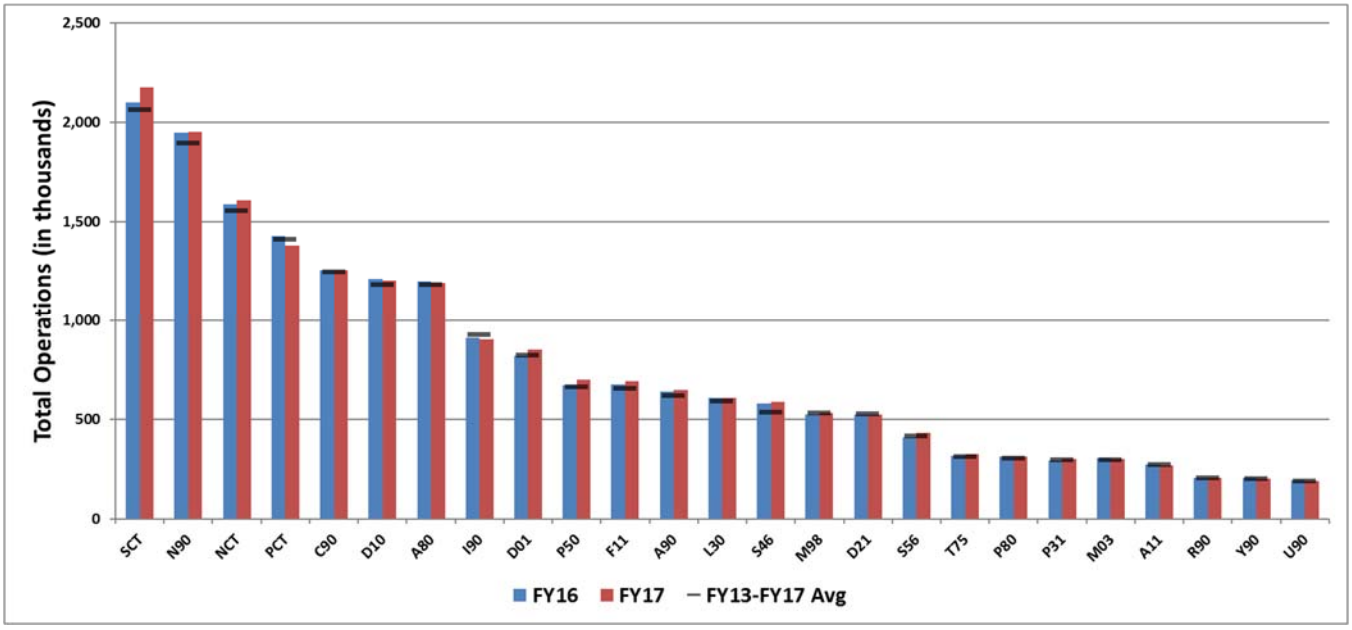
Airport	Rank*	FY13-17 Avg	FY16	FY17
LAX	**3**	655,310	685,889	702,912
LGA	**19**	370,441	374,720	366,247
MCO	**20**	312,345	323,148	332,454
MDW	**27**	251,571	252,326	251,692
MEM	**28**	225,460	224,541	222,271
MIA	**15**	406,476	416,920	408,842
MSP	**13**	415,598	410,593	415,406
ORD	**2**	873,816	872,332	859,271
PHL	**18**	408,409	402,013	371,901
PHX	**12**	436,127	442,322	432,025
SAN	**29**	194,548	195,527	205,017
SEA	**14**	367,870	407,637	414,009
SFO	**9**	435,788	447,252	453,397
SLC	**21**	322,968	318,285	325,093
TPA	**30**	188,340	189,302	192,567

*Ranked by FY17 operations.

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Operations Network (OPSNET), January 29, 2018.

Stand-Alone Terminal Radar Control (TRACON) Facilities

TRACON operations are the count of IFR and VFR itinerant operations passed to and from area airports or centers, including overflights through TRACON airspace. In FY2017, among the 25 stand-alone TRACONs, operation rose by 0.8 percent, from 19.2 in FY2016 to 19.3 million. Below are operation counts for each of the 25 stand-alone TRACONs for FY2016 and FY2017. Southern California (SCT), New York (N90), and Northern California (NCT) had the highest number of operations, each with operations above 1.5 million. Operations at each of the three grew in FY2017. (*See*, Appendix I for explanations of the TRACON facility codes.)



Total Stand-Alone TRACON Operations			
FY13-17 Avg	FY16	FY17	%Change
18,910,299	19,185,883	19,345,882	0.8%

TRACON	Rank*	FY13-17 Avg	FY16	FY17
A11	22	270,117	270,295	267,751
A80	7	1,185,126	1,198,348	1,193,926
A90	12	619,718	639,498	649,110
C90	5	1,248,287	1,254,412	1,255,922
D01	9	824,224	820,064	850,930
D10	6	1,184,418	1,213,222	1,202,735
D21	16	528,168	521,998	523,154
F11	11	656,163	673,746	692,938
I90	8	928,798	913,611	903,379
L30	13	593,233	605,514	609,118
M03	21	294,529	301,930	297,172
M98	15	531,116	525,247	530,741
N90	2	1,898,579	1,949,388	1,953,663

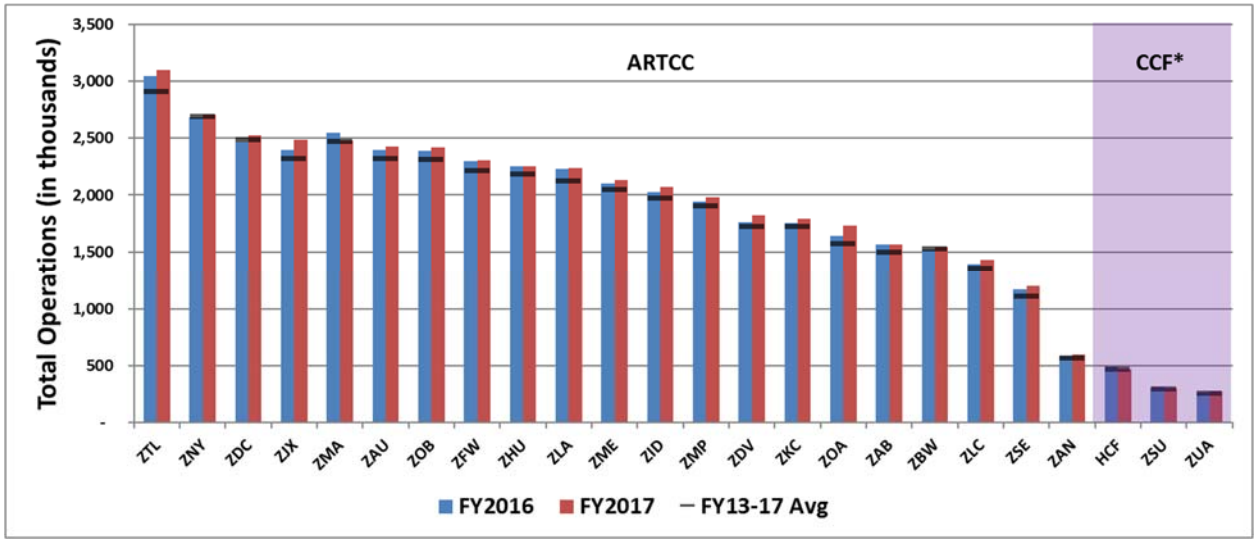
TRACON	Rank*	FY13-17 Avg	FY16	FY17
NCT	3	1,557,035	1,586,639	1,607,203
P31	20	293,100	292,432	298,804
P50	10	663,279	672,972	699,983
P80	19	301,382	312,801	312,791
PCT	4	1,412,339	1,426,859	1,378,247
R90	23	205,616	207,577	207,429
S46	14	533,907	578,654	587,978
S56	17	415,325	408,675	431,241
SCT	1	2,063,034	2,099,756	2,176,421
T75	18	309,925	313,275	322,354
U90	25	190,335	193,466	191,046
Y90	24	202,548	205,504	201,846

*Ranked by FY2017 operations.

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Operations Network (OPSNET), May 14, 2018.

Air Route Traffic Control Centers (ARTCC) and Combined Control Facilities (CCF)

ARTCC or en route operations are the count of IFR and VFR itinerant operations passing to and from a TRACON to a center, or from one center to another center, or from a center to a TRACON. It includes U.S. overflights and oceanic traffic through center air space that do not arrive at or depart from U.S. territory. In FY2017, en route operation numbers for the 21 ARTCC and 3 CCFs rose by 1.4 percent, from 43.2 to 43.9 million. Below are operation counts by center for FY2016 and FY2017. Atlanta (ZTL), New York (ZNY), and DC (ZDC) reported the highest number of operations, each above 2.5 million. (*See*, Appendix I for explanations of the ARTCC and CCF codes.)



Total ARTCC & CCF Operations			
FY13-17 Avg	**FY16**	**FY17**	**%Change**
42,069,294	43,231,160	43,857,291	1.4%

Center	Rank**	FY13-17 Avg	FY16	FY17
HCF	**22**	470,315	489,032	471,946
ZAB	**17**	1,498,371	1,564,647	1,566,140
ZAN	**21**	566,953	582,494	595,686
ZAU	**6**	2,318,867	2,397,472	2,422,857
ZBW	**18**	1,529,882	1,523,097	1,545,695
ZDC	**3**	2,485,683	2,464,286	2,527,500
ZDV	**14**	1,723,346	1,764,984	1,819,597
ZFW	**8**	2,217,727	2,299,251	2,308,606
ZHU	**9**	2,186,150	2,250,837	2,250,740
ZID	**12**	1,971,160	2,023,298	2,068,296
ZJX	**4**	2,317,159	2,393,729	2,485,788
ZKC	**15**	1,723,313	1,751,235	1,792,081

Center	Rank**	FY13-17 Avg	FY16	FY17
ZLA	**10**	2,125,442	2,229,653	2,240,289
ZLC	**19**	1,352,822	1,394,441	1,429,054
ZMA	**5**	2,473,105	2,546,654	2,480,528
ZME	**11**	2,045,375	2,099,894	2,131,376
ZMP	**13**	1,907,192	1,941,944	1,977,176
ZNY	**2**	2,691,167	2,684,769	2,706,705
ZOA	**16**	1,575,077	1,640,881	1,734,144
ZOB	**7**	2,314,227	2,387,361	2,415,492
ZSE	**20**	1,112,257	1,173,627	1,206,438
ZSU	**23**	298,226	312,528	304,548
ZTL	**1**	2,907,828	3,047,184	3,101,809
ZUA	**24**	257,653	267,862	274,800

*Data for CCF JCF are not available.

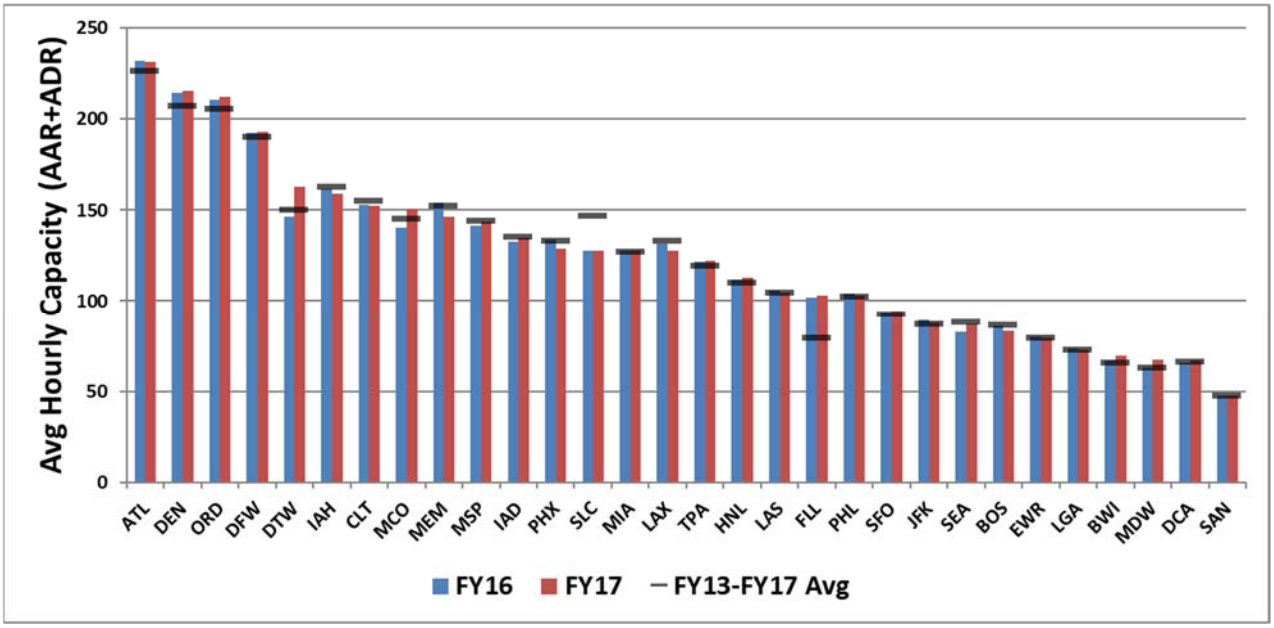
**Ranked by FY2017 operations.

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Operations Network (OPSNET), January 24, 2018.

Average Hourly Capacity (Called Rate) at Core 30 Airports

In general, airport capacity is determined by its runways and surrounding airspace. For the purpose of this report, capacity is represented by an airport's called rates for reportable hours.

In FY2017, ASPM data for the Core 30 airports show that the highest average hourly called rates are at Atlanta (ATL), Denver (DEN), and Chicago O'Hare (ORD). Each had an average called rate of over 200 operations per hour. The largest increase occurred at Detroit (DTW) (up 11 percent). Another large increase in capacity took place at Orlando (MCO) due to its new runway, 10R/28L. (*See*, Appendix I for explanations of the Core 30 airport codes.)



AHC Across All Core 30 Airports			
FY13-17 Avg	**FY16**	**FY17**	**%Change**
3,678	3,692	3,716	0.6%

Airport	Rank*	FY13-17 Avg	FY16	FY17
ATL	**1**	226	232	232
BOS	**24**	86	86	83
BWI	**27**	66	67	70
CLT	**7**	155	153	152
DCA	**29**	66	66	67
DEN	**2**	207	214	216
DFW	**4**	190	192	193
DTW	**5**	150	147	163
EWR	**25**	80	80	80
FLL	**19**	79	102	103
HNL	**17**	110	112	113
IAD	**11**	135	133	135
IAH	**6**	163	162	159
JFK	**22**	87	89	88
LAS	**18**	104	106	105

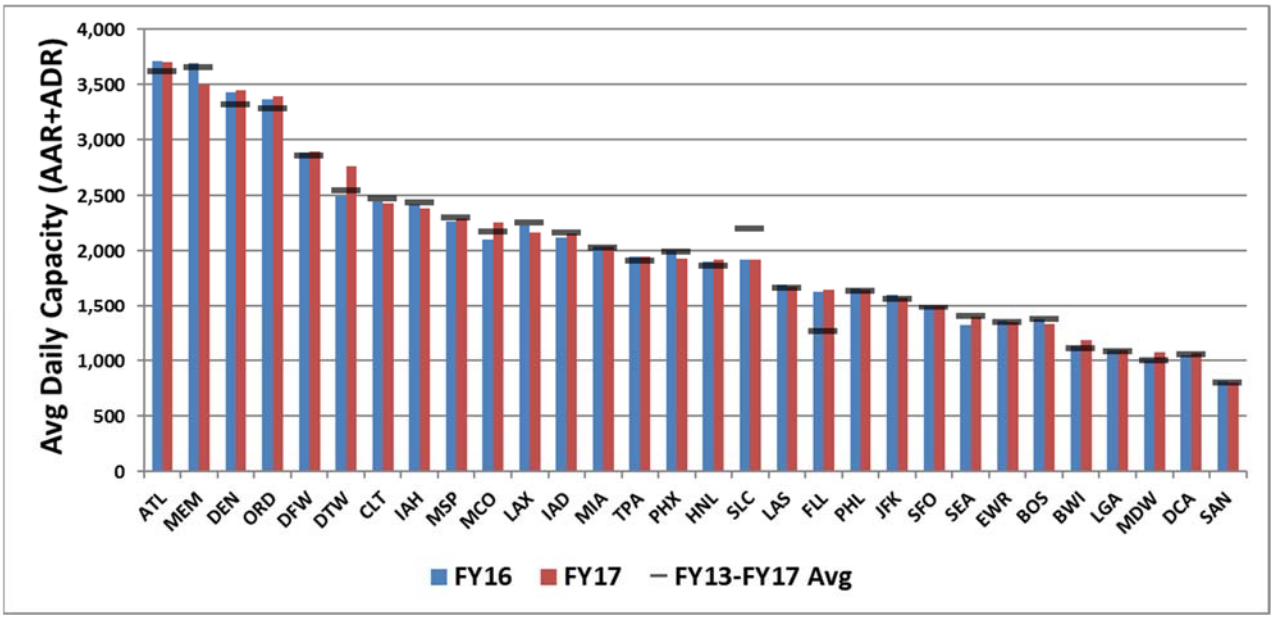
Airport	Rank*	FY13-17 Avg	FY16	FY17
LAX	**15**	133	131	128
LGA	**26**	73	73	73
MCO	**8**	145	140	151
MDW	**28**	63	63	68
MEM	**9**	152	154	146
MIA	**14**	127	128	128
MSP	**10**	144	141	144
ORD	**3**	205	210	212
PHL	**20**	102	104	103
PHX	**12**	133	134	129
SAN	**30**	47	48	47
SEA	**23**	88	83	87
SFO	**21**	93	93	94
SLC	**13**	147	128	128
TPA	**16**	120	122	122

*Ranked by FY2017 call rates.

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Aviation System Performance Metrics (ASPM), January 30, 2018.

Average Daily Capacity (ADC) - Based on Called Rates at Core 30 Airports

In general, airport capacity is determined by its runways and surrounding airspace. For the purposes of this report, capacity is represented by the airport's called rates for reportable hours. ADC is the ATO's official tracking method for determining an airport's capacity during a day. In FY2017, ASPM data for the Core 30 airports show that the highest ADCs are found at Atlanta (ATL), Memphis (MEM), Denver (DEN), and Chicago O'Hare (ORD); each with an average of over 3,000 operations per day. Note that ADC is larger for Memphis (MEM) than most other airports because all 24 hours are reportable there. (*See*, Appendix I for explanations of the Core 30 airport codes.)



ADC Across All Core 30 Airports			
FY13-17 Avg	FY16	FY17	%Change
59,979	60,244	60,569	0.5%

Airport	Rank*	FY13-17 Avg	FY16	FY17
ATL	1	3,620	3,714	3,706
BOS	25	1,380	1,379	1,335
BWI	26	1,114	1,135	1,185
CLT	7	2,478	2,449	2,434
DCA	29	1,055	1,050	1,072
DEN	3	3,318	3,428	3,452
DFW	5	2,857	2,887	2,893
DTW	6	2,554	2,491	2,765
EWR	24	1,353	1,363	1,353
FLL	19	1,269	1,628	1,648
HNL	16	1,869	1,903	1,923
IAD	12	2,166	2,123	2,161
IAH	8	2,442	2,423	2,385
JFK	21	1,569	1,605	1,578
LAS	18	1,671	1,694	1,674

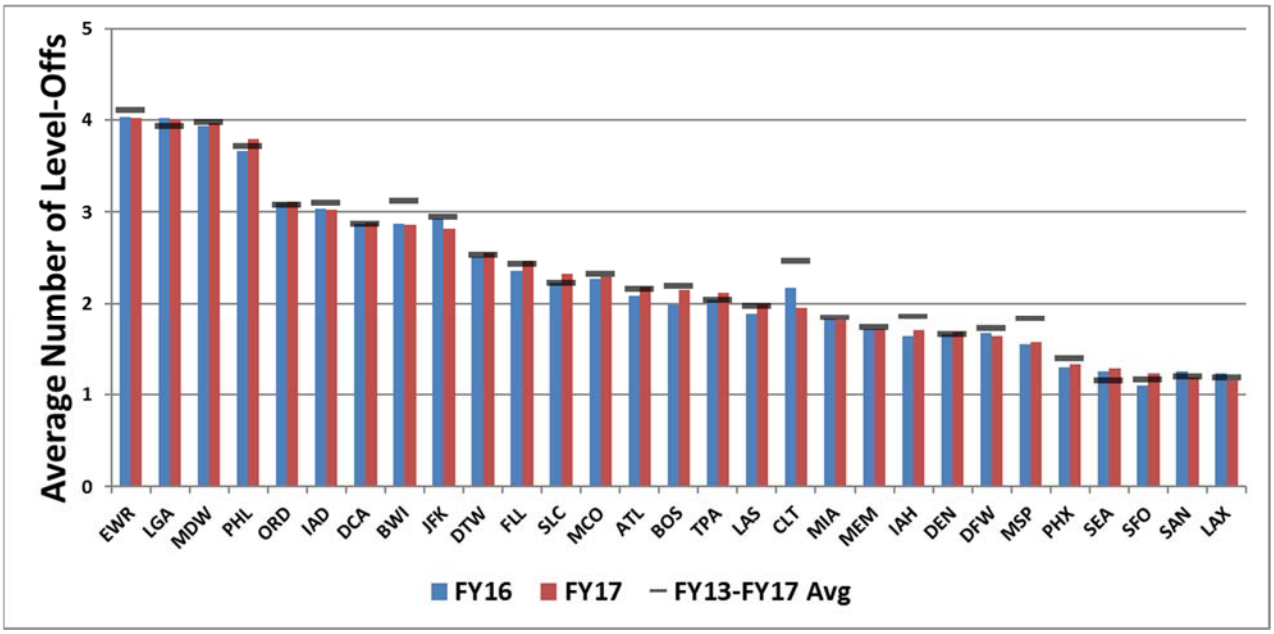
Airport	Rank*	FY13-17 Avg	FY16	FY17
LAX	11	2,262	2,234	2,169
LGA	27	1,089	1,097	1,092
MCO	10	2,178	2,107	2,259
MDW	28	1,006	1,010	1,081
MEM	2	3,656	3,693	3,508
MIA	13	2,035	2,042	2,044
MSP	9	2,304	2,263	2,299
ORD	4	3,288	3,367	3,394
PHL	20	1,637	1,662	1,647
PHX	15	1,995	2,004	1,930
SAN	30	806	812	807
SEA	23	1,408	1,325	1,395
SFO	22	1,484	1,491	1,508
SLC	17	2,206	1,919	1,919
TPA	14	1,912	1,946	1,953

*Ranked by FY2017 daily capacity.

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Aviation System Performance Metrics (ASPM), January 30, 2018.

Level Flight: Average Number of Level-Offs at Core 30 Airports

Level-offs are tracked from the Top-of-Descent (TOD) point or 200 nautical miles (NM) from the airport, whichever is closer. A trajectory segment is considered as a level-off if the change in altitude of position reports is less than or equal to 200 feet and the segment is at least 50 seconds in duration. The level off metric is calculated as the **sum of the count of level-offs** for each flight within a scope (i.e. non-military, Instrument Flight Rules (IFR) operations arriving at Core Airports), divided by the total number of flights within the scope. The metric is derived from flight position reports from the National Offload Program (NOP). Core 30 airports with the highest average number of level-offs (four level-offs) are Newark (EWR), LaGuardia (LGA), Chicago Midway (MDW), and Philadelphia (PHL). (*See*, Appendix I for explanations of the Core 30 airport codes.)



Airport*	FY13-17 Avg	FY16	FY17
ATL	2	2	2
BOS	2	2	2
BWI	3	3	3
CLT	2	2	2
DCA	3	3	3
DEN	2	2	2
DFW	2	2	2
DTW	3	3	3
EWR	4	4	4
FLL	2	2	2
HNL	-	-	-
IAD	3	3	3
IAH	2	2	2
JFK	3	3	3
LAS	2	2	2

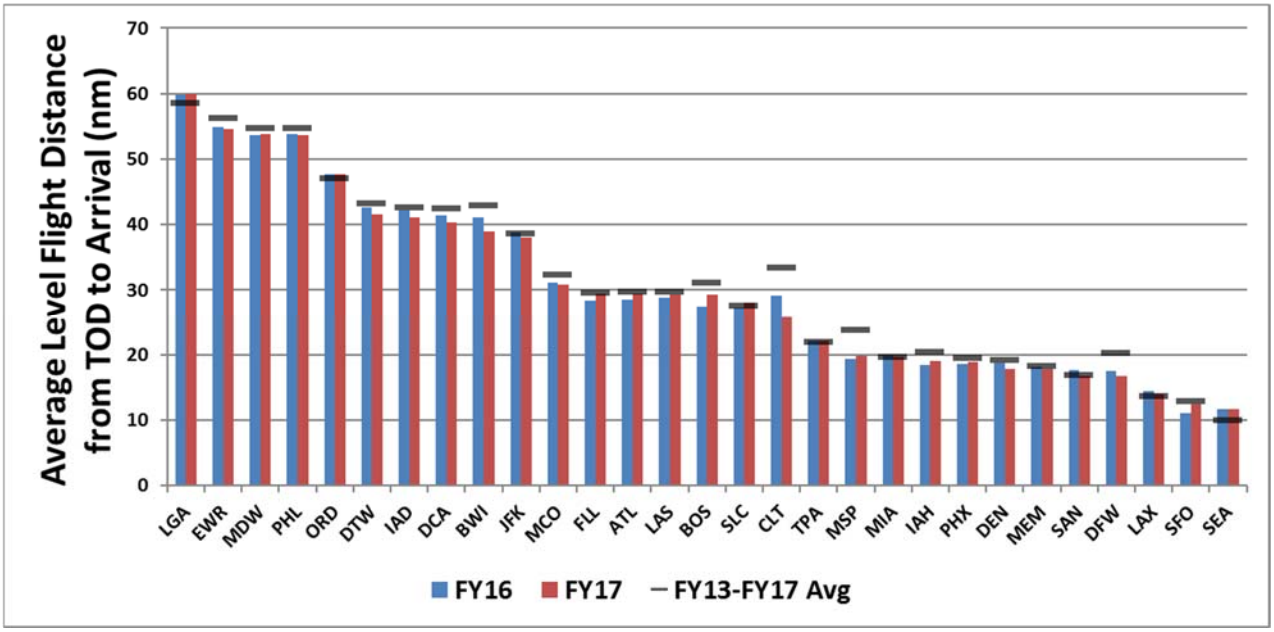
Airport*	FY13-17 Avg	FY16	FY17
LAX	1	1	1
LGA	4	4	4
MCO	2	2	2
MDW	4	4	4
MEM	2	2	2
MIA	2	2	2
MSP	2	2	2
ORD	3	3	3
PHL	4	4	4
PHX	1	1	1
SAN	1	1	1
SEA	1	1	1
SFO	1	1	1
SLC	2	2	2
TPA	2	2	2

*Ranked alphabetically.

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, National Offload Program (NOP), March 5, 2018.

Level Flight: Average Level Flight Distance from TOD to Arrival at Core 30 Airports

Level-offs are tracked from the Top-of-Descent (TOD) point or 200 nautical miles (NM) from the airport, whichever is closer. A trajectory segment is considered as a level-off if the change in altitude of position reports is less than or equal to 200 feet and the segment is at least 50 seconds in duration. The level flight metric is calculated as the **sum of the total distance flown** during level-off segments for all flights within the scope (i.e. non-military, Instrument Flight Rules (IFR) operations arriving at Core Airports), divided by the total number of flights within the scope. The metric is derived from flight position reports from the National Offload Program (NOP). Core 30 airports with the highest average level flight distance (over 50 nautical miles) are LaGuardia (LGA), Newark (EWR), Chicago Midway (MDW), and Philadelphia (PHL). (*See*, Appendix I for explanations of the Core 30 airport codes.)



Airport*	FY13-17 Avg	FY16	FY17
ATL	30	29	29
BOS	31	27	29
BWI	43	41	39
CLT	33	29	26
DCA	43	41	40
DEN	19	19	18
DFW	20	17	17
DTW	43	43	42
EWR	56	55	55
FLL	30	28	30
HNL	-	-	-
IAD	43	42	41
IAH	20	18	19
JFK	39	39	38
LAS	30	29	29

Airport*	FY13-17 Avg	FY16	FY17
LAX	14	14	14
LGA	59	60	60
MCO	32	31	31
MDW	55	54	54
MEM	18	18	18
MIA	20	20	20
MSP	24	19	20
ORD	47	48	48
PHL	55	54	54
PHX	19	19	19
SAN	17	18	17
SEA	10	12	12
SFO	13	11	12
SLC	28	27	28
TPA	22	22	22

*Ranked alphabetically.

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration (AJR-G), National Offload Program (NOP), March 5, 2018.

NAS Delay, Diversions, Go-Arounds, and Cancellations

Only flights departing from or arriving at their destination at least 15 minutes late are counted as a NAS system delay. The charts that appear below are based on OPSNET numbers, ATO's official source for delay data. Many factors contribute to delay, with weather is the most frequently cited reason. Delay imposes stress on the NAS, the air traffic controllers, passengers, and the economy.

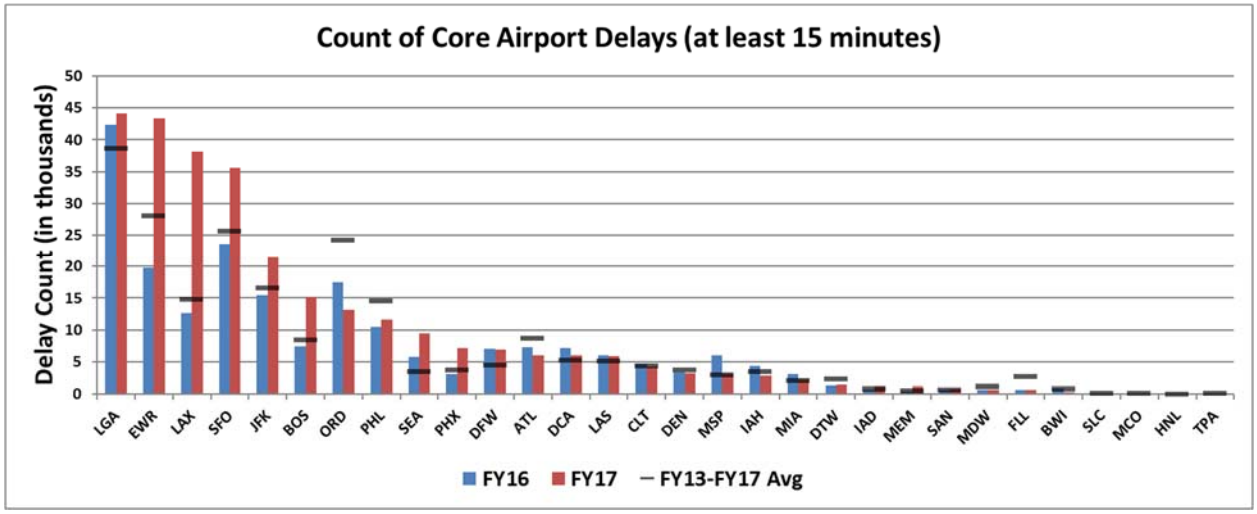
Diversions occur when a flight is routed to a different airport than its original destination. This occurs usually due to convective weather. Other less frequent reasons for diversions are medical emergencies, security, issues with the aircraft, or issues with passengers or crewmembers.

Go-Arounds occur when an aircraft is on approach to the runway but suddenly aborts the landing. This occurs if there is a sudden shift in the wind, an obstruction on the runway, or possibly, the aircraft inadvertently overshooting the runway. Go-arounds result in the aircraft returning to the landing queue to attempt another landing.

Cancellations can occur for numerous reasons either due to weather, extensive delays in the system, equipment issues, etc. Air carriers cancel their own flights in response to these issues. Since the three-hour tarmac rule was imposed after 2010, more flights have been cancelled. This increase in cancellations means reductions in the number of recorded delays.

Counts of NAS Delay at Core 30 Airports

For FY2017, OPSNET data show that the number of Core 30 airport departure delays of at least 15 minutes increased 35 percent. In FY2016 and FY2017, there were 211,966 and 286,187 delays, respectively. According to the graph and table below, in FY2017, delays were highest at LaGuardia (LGA), Newark (EWR), Los Angeles (LAX), and San Francisco (SFO), each with over 35,000 delays. Together these four airports accounted for well over one-half of all Core 30 airport delays. (*See*, Appendix I for explanations of the Core 30 airport codes.)



Core 30 Total Delay Counts			
FY13-17 Avg	**FY16**	**FY17**	**%Change**
227,296	211,966	286,187	35.0%

Airport	Rank*	FY13-17 Avg	FY16	FY17
ATL	**12**	7,656	7,246	5,985
BOS	**6**	9,185	7,370	15,191
BWI	**26**	869	920	326
CLT	**15**	3,916	4,558	4,215
DCA	**13**	5,592	7,120	5,975
DEN	**16**	4,120	3,277	3,144
DFW	**11**	4,303	7,020	6,963
DTW	**20**	2,240	1,254	1,392
EWR	**2**	16,731	19,814	43,426
FLL	**25**	184	645	688
HNL	**29**	44	27	68
IAD	**21**	814	668	1,213
IAH	**18**	4,144	4,357	2,796
JFK	**5**	17,385	15,420	21,472
LAS	**14**	5,230	6,054	5,902

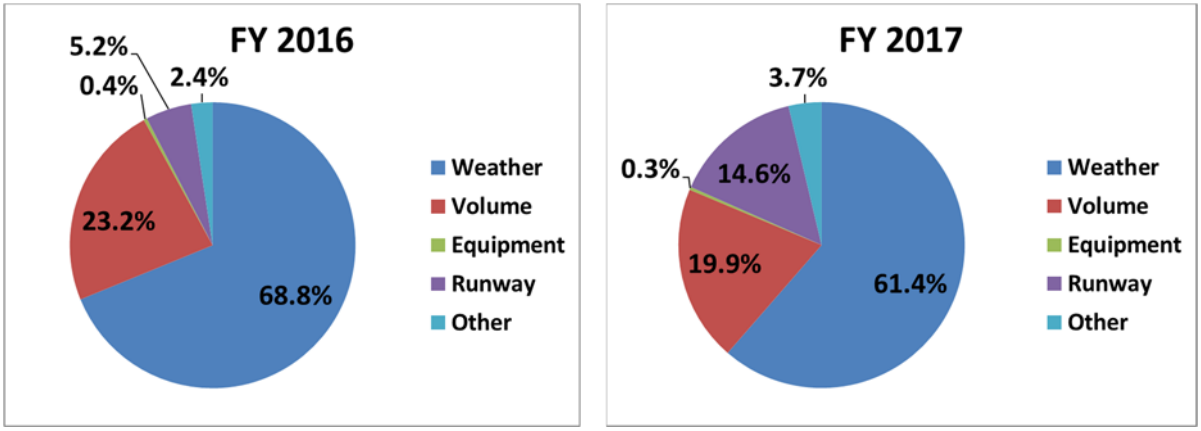
Airport	Rank*	FY13-17 Avg	FY16	FY17
LAX	**3**	15,727	12,582	38,078
LGA	**1**	38,039	42,296	44,182
MCO	**28**	144	166	153
MDW	**24**	1,903	611	694
MEM	**22**	225	355	1,114
MIA	**19**	2,036	3,056	2,186
MSP	**17**	3,192	5,990	3,086
ORD	**7**	26,016	17,523	13,181
PHL	**8**	14,244	10,432	11,597
PHX	**10**	3,805	3,021	7,146
SAN	**23**	564	656	808
SEA	**9**	1,792	5,742	9,387
SFO	**4**	22,964	23,641	35,603
SLC	**27**	45	62	187
TPA	**30**	97	83	29

*Ranked by number of FY2017 delays.

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Operations Network (OPSNET), January 31, 2018.

Delays by Category

The two charts below show the sources of delays at Core 30 airports by type of delay.



Note: System impact delays are delays assigned to causal facilities in OPSNET, composed of TMI to delays, departure delays, and airborne delays. System impact delays are also the basis for delays by class and delays by cause in OPSNET. (http://aspmhelp.faa.gov/index.php/OPSNET_Reports:_Definitions_of_Variables)

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Operations Network (OPSNET), February 1, 2018.

Total Cost of Delay

The total cost of flight delays is the sum of costs to airlines, passengers, lost demand, and indirect costs. Office of Performance Analysis estimates show in 2017, the cost of delayed flights increased by 11.3 percent, from $23.9 to $26.6 billion, an increase of $2.7 billion. Most of this increase was due to an increase in the impact of delays on passengers, from $13.3 to $14.8 billion, an increase of $1.5 billion. Between 2012 and 2017, the cost of flight delays increased from $19.2 to $26.6 billion, an increase of $7.2 billion. The cost to passengers accounted for $5.1 billion of this increase.

$Billions	2012	2013	2014	2015	2016	2017
Airlines[1]	5.7	6.4	5.3	5.8	5.7	6.4
Passengers[2]	9.7	11.6	9.5	13.2	13.3	14.8
Lost Demand[3]	1.3	1.5	1.2	1.7	1.8	2.0
Indirect[4]	2.5	2.9	2.4	3.1	3.1	3.4
Total	**19.2**	**22.4**	**18.4**	**23.8**	**23.9**	**26.6**

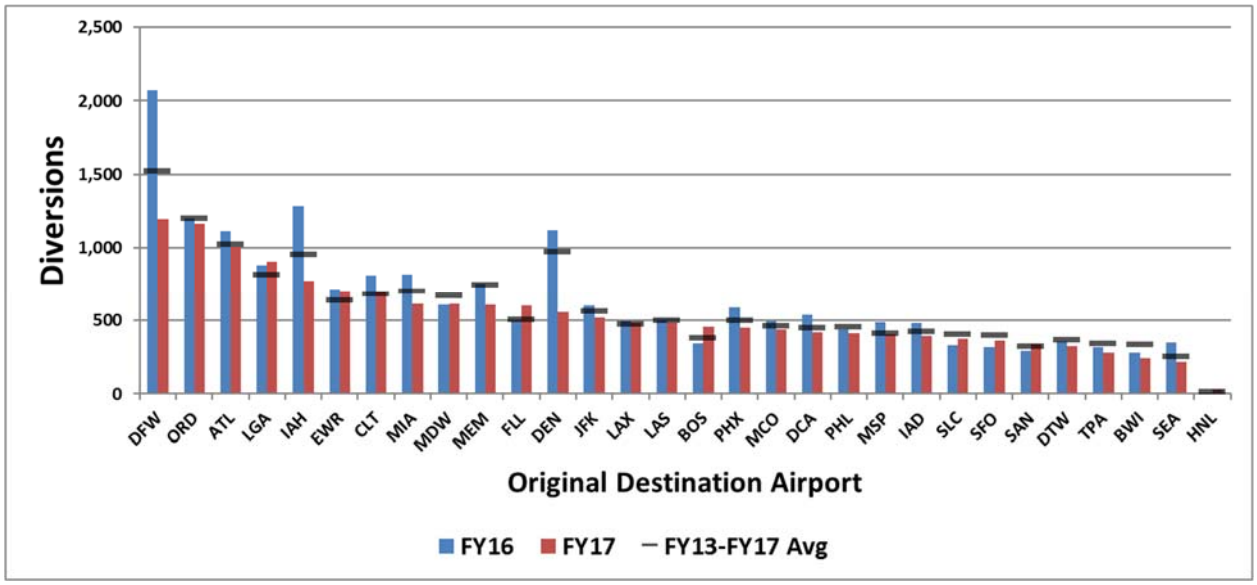
Notes:

1. **Airlines** (cost of delay to airlines): Increased expenses for crew, fuel, maintenance, etc.
2. **Passengers** (cost of delay to passengers): Time lost due to schedule buffer, delayed flights, flight cancellations, and missed connections.
3. **Lost Demand** (cost of passenger decisions to avoid future air travel): Estimated welfare loss incurred by passengers who avoid future air travel as the result of delays.
4. **Indirect** (indirect cost of delay): Other business sectors depend on air travel for transportation. Air travel delays impact these sectors by increasing costs in terms of dollars and time.

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration.

Diversions at Core 30 Airports

The airports reported below are the original intended destinations for the diverted aircraft. Increases in the number of diversions can indicate capacity issues at the airport due to weather, construction, or volume. Over all Core 30 airports, ASPM data show the number of diversions fell by 15.9 percent in FY2017. Consistent with the graph and table below, there was a 42.4 percent decrease in diversions for aircraft destined for Dallas (DFW), a 39.8 percent decrease at Houston (IAH), and a 50.3 percent decrease at Denver (DEN). (*See*, Appendix I for explanations of the Core 30 airport codes.)



Core 30 Total Diversions			
FY13-17 Avg	FY16	FY17	%Change
17,524	19,095	16,061	-15.9%

Airport	Rank*	FY13-17 Avg	FY16	FY17
ATL	3	1,022	1,113	1,007
BOS	16	379	346	454
BWI	28	336	281	242
CLT	7	682	811	694
DCA	19	449	542	417
DEN	12	973	1,118	556
DFW	1	1,525	2,070	1,192
DTW	26	366	358	327
EWR	6	641	713	704
FLL	11	510	496	603
HNL	30	17	0	30
IAD	22	425	479	395
IAH	5	958	1,285	774
JFK	13	562	599	522
LAS	15	498	506	480

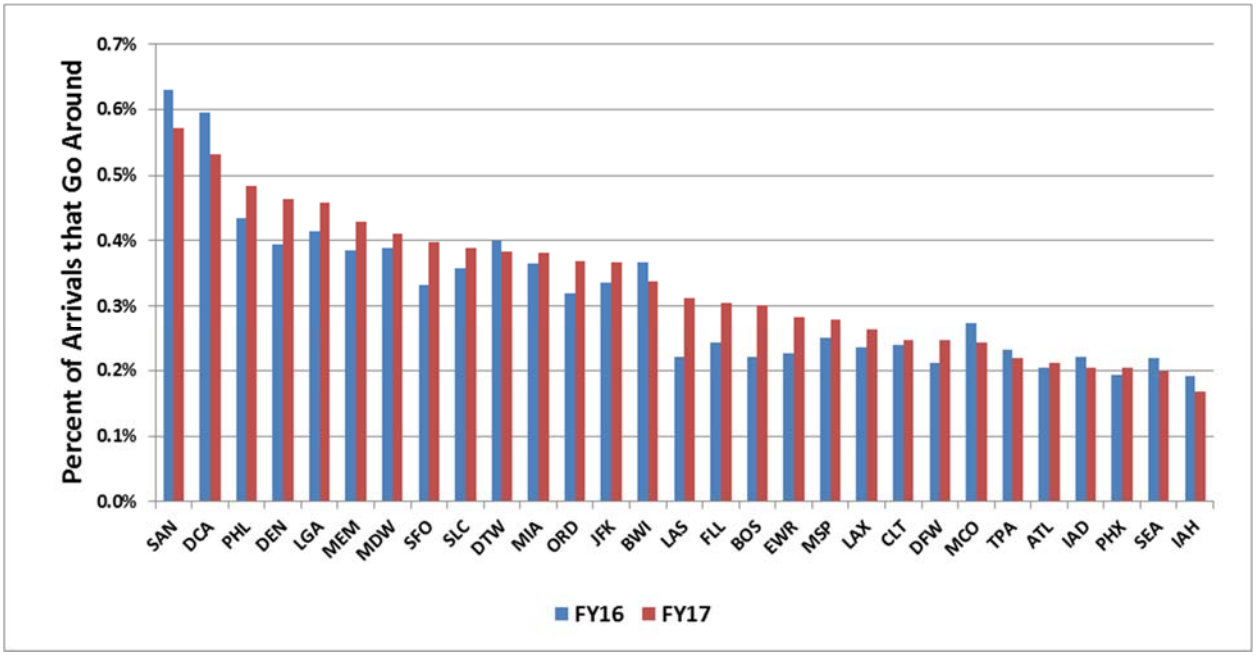
Airport	Rank*	FY13-17 Avg	FY16	FY17
LAX	14	475	496	482
LGA	4	815	881	903
MCO	18	463	495	441
MDW	9	674	611	614
MEM	10	748	753	609
MIA	8	703	814	616
MSP	21	412	488	405
ORD	2	1,203	1,203	1,162
PHL	20	456	435	410
PHX	17	498	589	451
SAN	25	327	294	339
SEA	29	257	349	218
SFO	24	401	319	361
SLC	23	404	332	373
TPA	27	342	319	280

*Ranked by number of FY2017 diversions.

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Aviation System Performance Metrics (ASPM), February 2, 2018.

Go-Arounds at Core 30 Airports

FY2016 and FY2017 go-arounds as a percent of arrivals at each Core 30 airport (except Honolulu) appear below. In FY2017, go-arounds at each Core 30 airport did not exceed 0.6 percent; average go-arounds across all Core 30 airports were 0.3 percent. For each year from FY2012 to FY2017, go-arounds averaged 0.3 percent. These estimates are based from ASPM and CountOps data. (*See*, Appendix I for explanations of the Core 30 airport codes.)



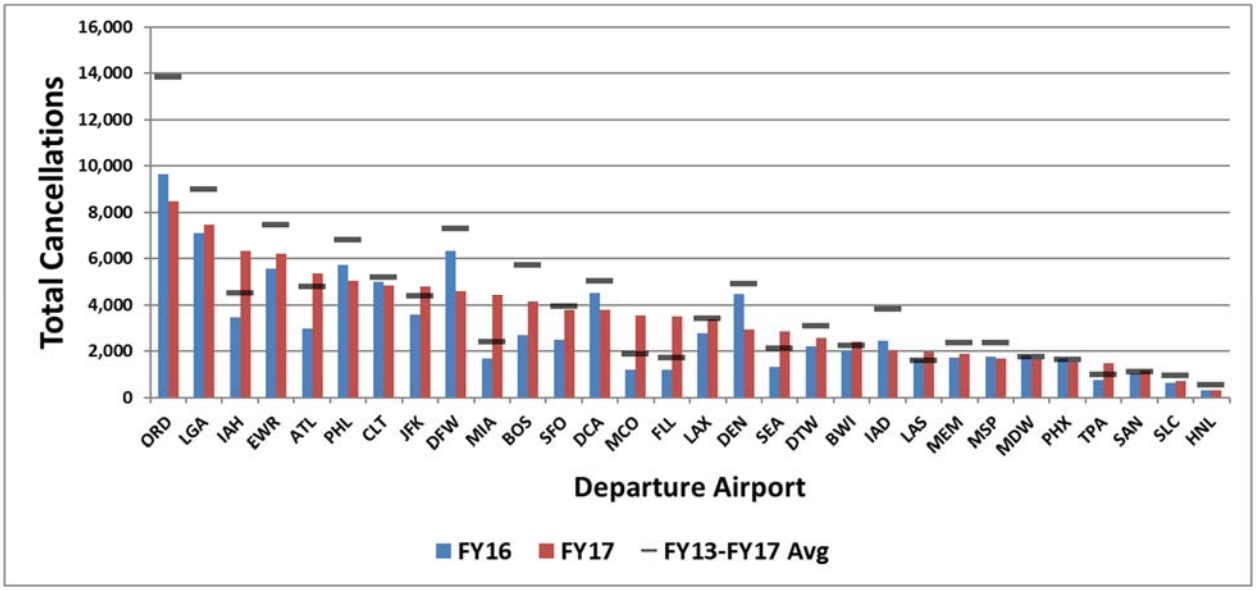
Airport	FY13-17 Avg	FY16	FY17
ATL	0.2%	0.2%	0.2%
BOS	0.2%	0.2%	0.3%
BWI	0.4%	0.4%	0.3%
CLT	0.2%	0.2%	0.2%
DCA	0.5%	0.6%	0.5%
DEN	0.3%	0.4%	0.5%
DFW	0.2%	0.2%	0.2%
DTW	0.3%	0.4%	0.4%
EWR	0.2%	0.2%	0.3%
FLL	0.3%	0.2%	0.3%
IAD	0.2%	0.2%	0.2%
IAH	0.2%	0.2%	0.2%
JFK	0.3%	0.3%	0.4%
LAS	0.2%	0.2%	0.3%
LAX	0.2%	0.2%	0.3%

Airport	FY13-17 Avg	FY16	FY17
LGA	0.5%	0.4%	0.5%
MCO	0.3%	0.3%	0.2%
MDW	0.4%	0.4%	0.4%
MEM	0.4%	0.4%	0.4%
MIA	0.4%	0.4%	0.4%
MSP	0.2%	0.2%	0.3%
ORD	0.3%	0.3%	0.4%
PHL	0.4%	0.4%	0.5%
PHX	0.2%	0.2%	0.2%
SAN	0.6%	0.6%	0.6%
SEA	0.2%	0.2%	0.2%
SFO	0.4%	0.3%	0.4%
SLC	0.3%	0.4%	0.4%
TPA	0.2%	0.2%	0.2%

Sources: Go-arounds: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Aviation System Performance Metrics (ASPM), March 16, 2018; Arrivals: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, CountOps, March 16, 2018.

Cancellations at Core 30 Airports

Flight cancellation data come from ASPM. In FY2017, flight departure cancellations at Core 30 airports increased 16.9 percent. As mentioned previously, cancellations may be due to weather, system delays, equipment issues, or other reasons. The graph and table below show flight cancellations at Core 30 airports for FY2016 and FY2017. The airports with the highest number of cancellations were Chicago O'Hare (ORD), LaGuardia (LGA). Houston (IAH), and Newark (EWR). Each had over 6,000 cancellations and together accounted for more than 27 percent of Core 30 airport cancellations. (*See*, Appendix I for explanations of the Core 30 airport codes.)



Core 30 Total Cancellations			
FY13-17 Avg	FY16	FY17	%Change
117,025	89,764	104,917	16.9%

Airport	FY13-17 Avg	FY16	FY17
ATL	4,811	2,961	5,355
BOS	5,737	2,705	4,142
BWI	2,243	2,031	2,398
CLT	5,193	4,999	4,829
DCA	5,043	4,498	3,797
DEN	4,908	4,489	2,930
DFW	7,288	6,311	4,611
DTW	3,088	2,217	2,591
EWR	7,458	5,564	6,216
FLL	1,732	1,194	3,501
HNL	547	307	325
IAD	3,805	2,446	2,047
IAH	4,493	3,471	6,312
JFK	4,370	3,600	4,806
LAS	1,601	1,632	1,951

Airport	FY13-17 Avg	FY16	FY17
LAX	3,431	2,764	3,380
LGA	8,996	7,092	7,455
MCO	1,889	1,220	3,530
MDW	1,768	1,819	1,656
MEM	2,372	1,726	1,892
MIA	2,417	1,683	4,447
MSP	2,358	1,759	1,693
ORD	13,849	9,628	8,465
PHL	6,821	5,709	5,035
PHX	1,643	1,672	1,530
SAN	1,134	1,057	1,177
SEA	2,144	1,315	2,857
SFO	3,956	2,493	3,804
SLC	952	644	709
TPA	981	758	1,476

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Aviation System Performance Metrics (ASPM), March 13, 2018.

Traffic Management Initiatives

Traffic Management Initiatives (TMIs) are programs and tools that ATC may use to manage air traffic. These initiatives can take a number of forms, depending on the need and situation. Some TMIs are used to manage excess demand or a lowered acceptance rate at a particular airport. Other TMIs are used to manage traffic issues in the en route environment usually caused by convective weather. The TMIs reported in this report include:

Ground Delay Programs (GDP)

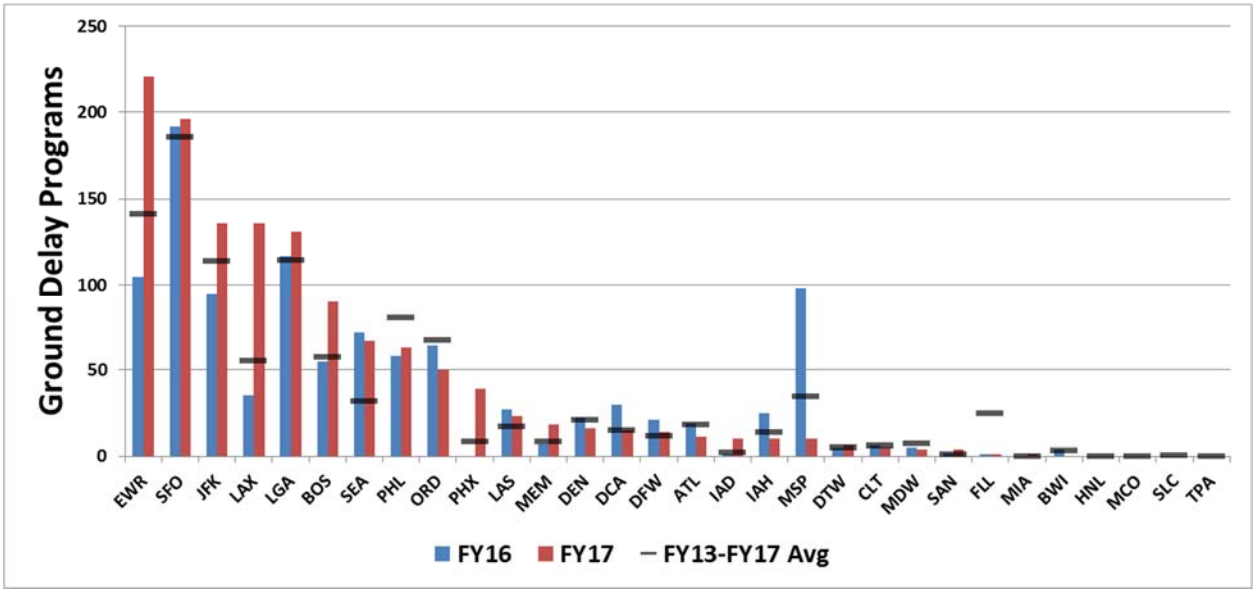
Ground stops (GS)

Airspace Flow Programs (AFP)

Holdings

Ground Delay Programs at Core 30 Airports

A Ground Delay Program (GDP) is a TMI where aircraft are delayed at their departure airport in order to reconcile demand with capacity at their arrival airport. They are airport-specific, therefore, each GDP is reported for a particular airport. In FY2017, OPSNET data shows GDP increased by 110 and 288 percent at Newark (EWR) and Los Angeles (LAX), and declined by 90 percent at MSP. In FY2017, GDPs increased by 19.7 percent across all Core 30 airports, from 1,066 to 1,276. (*See*, Appendix I for explanations of the Core 30 airport codes.)



Total Core 30 GDPs			
FY13-17 Avg	FY16	FY17	%Change
1,047	1,066	1,276	19.7%

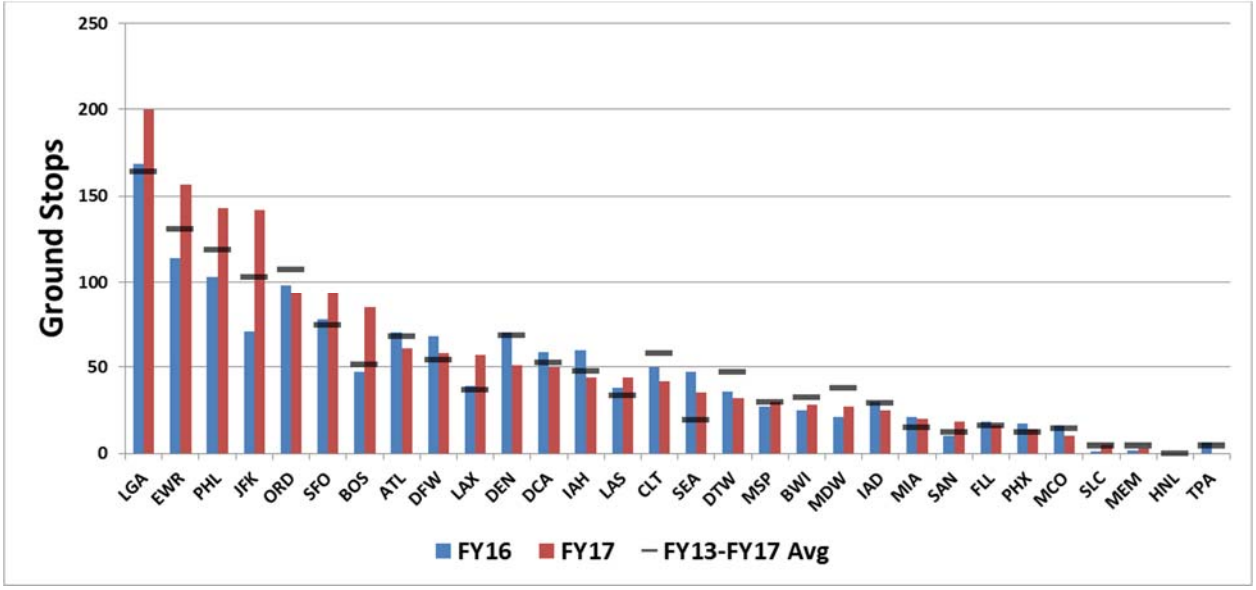
Airport	FY13-17 Avg	FY16	FY17
ATL	18	19	11
BOS	57	55	90
BWI	3	4	0
CLT	6	6	5
DCA	15	30	15
DEN	21	22	16
DFW	12	21	14
DTW	5	5	6
EWR	141	105	221
FLL	25	1	1
HNL	0	0	0
IAD	3	1	10
IAH	14	25	10
JFK	114	95	136
LAS	17	27	23

Airport	FY13-17 Avg	FY16	FY17
LAX	55	35	136
LGA	115	117	131
MCO	0	0	0
MDW	7	5	4
MEM	8	7	18
MIA	0	0	1
MSP	34	98	10
ORD	67	64	50
PHL	80	58	63
PHX	9	0	39
SAN	1	2	4
SEA	32	72	67
SFO	186	192	196
SLC	1	0	0
TPA	0	0	0

Source: Office of Performance Analysis (AJR-G). Air Traffic Organization, Federal Aviation Administration, Operations Network (OPSNET), March 13, 2018.

Ground Stops at Core 30 Airports

Ground stops are the most restrictive form of TMI because they hold all aircraft, within the scope of the ground stop, at their departure airports until conditions at the destination airport allow for their arrival. Ground stops only affect arrivals to a specific airport (not departures) and, like GDPs, are airport-specific. According to OPSNET data, in FY2017, ground stops increased by 18, 38, 39 and 100 percent at LaGuardia (LGA), Newark (EWR), Philadelphia (PHL), and JFK, respectively. Ground stops increased by 12.2 percent across all Core 30 airports, from 1,411 to 1,583. (*See*, Appendix I for explanations of the Core 30 airport codes.)



Total Core 30 Ground Stops			
FY13-17 Avg	FY16	FY17	%Change
1,452	1,411	1,583	12.2%

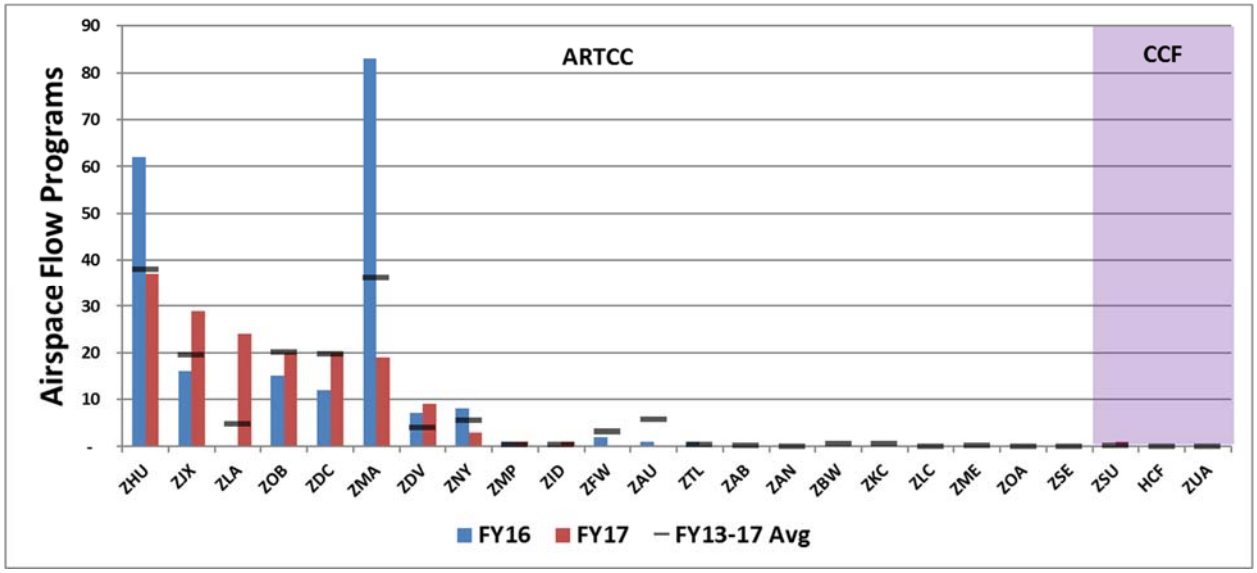
Airport	FY13-17 Avg	FY16	FY17
ATL	68	70	61
BOS	52	47	85
BWI	32	25	28
CLT	58	50	42
DCA	53	59	50
DEN	69	70	51
DFW	55	68	58
DTW	47	36	32
EWR	131	114	157
FLL	16	18	16
HNL	0	0	0
IAD	29	30	25
IAH	48	60	44
JFK	103	71	142
LAS	34	38	44

Airport	FY13-17 Avg	FY16	FY17
LAX	37	39	57
LGA	165	169	200
MCO	14	16	10
MDW	38	21	27
MEM	5	2	3
MIA	15	21	20
MSP	30	27	30
ORD	108	98	93
PHL	119	103	143
PHX	12	17	14
SAN	12	10	18
SEA	20	47	35
SFO	75	78	93
SLC	5	1	5
TPA	5	6	0

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Operations Network (OPSNET), March 13, 2018.

Airspace Flow Programs by Center

Imagine a line drawn in space in association with a constraint, usually convective weather. Under an airspace flow program, any flights filed that cross the line (usually only in one direction) are assigned an expected departure clearance time (EDCT), to ensure that it arrives at the line, or "boundary," at a time when it can be accommodated. In FY2017, there were 164 airspace flow programs imposed by air traffic managers versus 208 in FY2016, a decrease of 21.2 percent. Over the five years from FY2013 to FY2017, the number of airspace flow programs averaged 160 per year. The graph and table below show airspace flow programs by ARTCC. In FY2017 airspace flow programs mainly affected Houston (ZHU), Jacksonville (ZJX), Los Angeles (ZLA), Cleveland (ZOB), DC (ZDC), and Miami (ZMA). These estimates are based on National Traffic Management Log (NTML) data. (*See*, Appendix I for explanations of the ARTCC and CCF codes.)



* Data for CCF JCF are not available.

Total Centers Air Flow Programs			
FY13-17 Avg	**FY16**	**FY17**	**%Change**
160	208	164	-21.2%

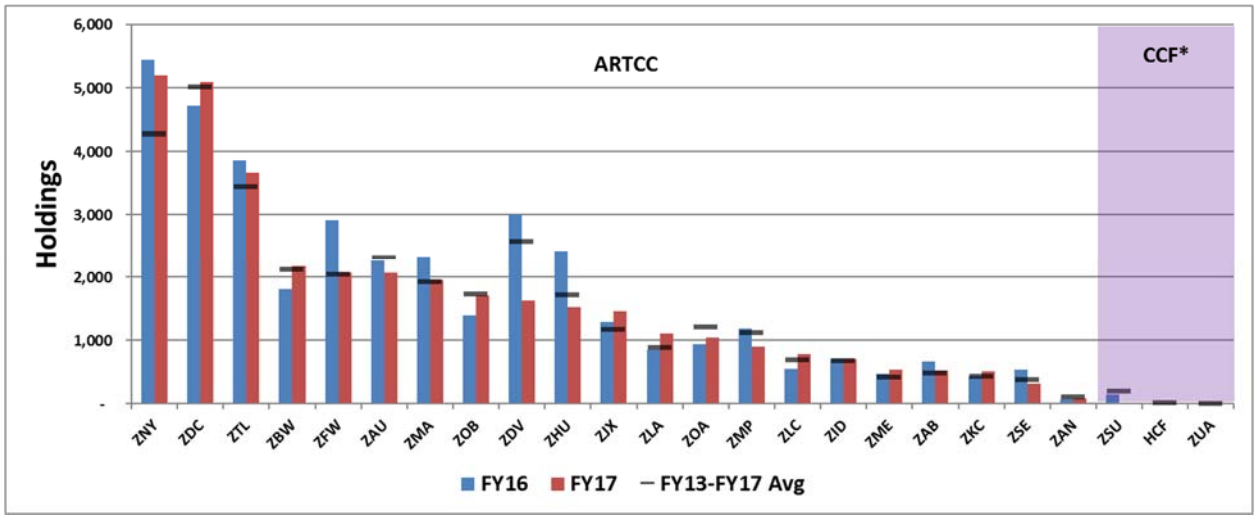
Center	FY13-17 Avg	FY16	FY17
HCF	0	0	0
ZAB	0	0	0
ZAN	0	0	0
ZAU	6	1	0
ZBW	1	0	0
ZDC	20	12	20
ZDV	4	7	9
ZFW	3	2	0
ZHU	38	62	37
ZID	0	0	1
ZJX	20	16	29
ZKC	1	0	0

Center	FY13-17 Avg	FY16	FY17
ZLA	5	0	24
ZLC	0	0	0
ZMA	36	83	19
ZME	0	0	0
ZMP	0	1	1
ZNY	6	8	3
ZOA	0	0	0
ZOB	20	15	20
ZSE	0	0	0
ZSU	0	0	1
ZTL	0	1	0
ZUA	0	0	0

Source: Technical Operations (AJW), Air Traffic Organization, Federal Aviation Administration, National Traffic Management Log (NTML), February 16, 2018.

Holdings by Center

A holding occurs when an aircraft is deliberately delayed en route by flying in a repeating rotational pattern. They are typically implemented when there is traffic congestion or convective weather at the destination airport or an adjacent facility. OPSNET data shows the highest numbers of holdings occur in the New York (ZNY), DC (ZDC), and Atlanta (ZTL) Air Route Traffic Control Centers (ARTCC). (See, the graph and table below.) In FY2017, the number of holdings declined by 7.6 percent. (*See*, Appendix I for explanations of the ARTCC and combined control facilities (CCF).)



* Data for CCF JCF are not available.

Total Center Flight Holdings			
FY13-17 Avg	**FY16**	**FY17**	**%Change**
35,008	38,006	35,102	-7.6%

Center	FY13-17 Avg	FY16	FY17
ZAB	480	672	527
ZAN	109	68	79
ZAU	2,315	2,264	2,072
ZBW	2,126	1,808	2,168
ZDC	5,022	4,716	5,097
ZDV	2,573	2,999	1,622
ZFW	2,044	2,912	2,074
ZHU	1,724	2,418	1,531
ZID	687	708	706
ZJX	1,170	1,287	1,458
ZKC	434	429	518
ZLA	883	854	1,114

Center	FY13-17 Avg	FY16	FY17
ZLC	688	554	783
ZMA	1,927	2,332	1,954
ZME	415	472	537
ZMP	1,123	1,182	899
ZNY	4,277	5,449	5,200
ZOA	1,211	934	1,048
ZOB	1,736	1,393	1,707
ZSE	387	534	321
ZTL	3,450	3,857	3,662
ZSU	198	149	20
HCF	24	12	4
ZUA	6	3	1

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, Federal Aviation Administration, Operations Network (OPSNET), March 13, 2018.

Safety Metrics

The U.S. National Airspace System is the safest air transportation system in the world. The Report presents metrics used to measure the safety of the NAS:

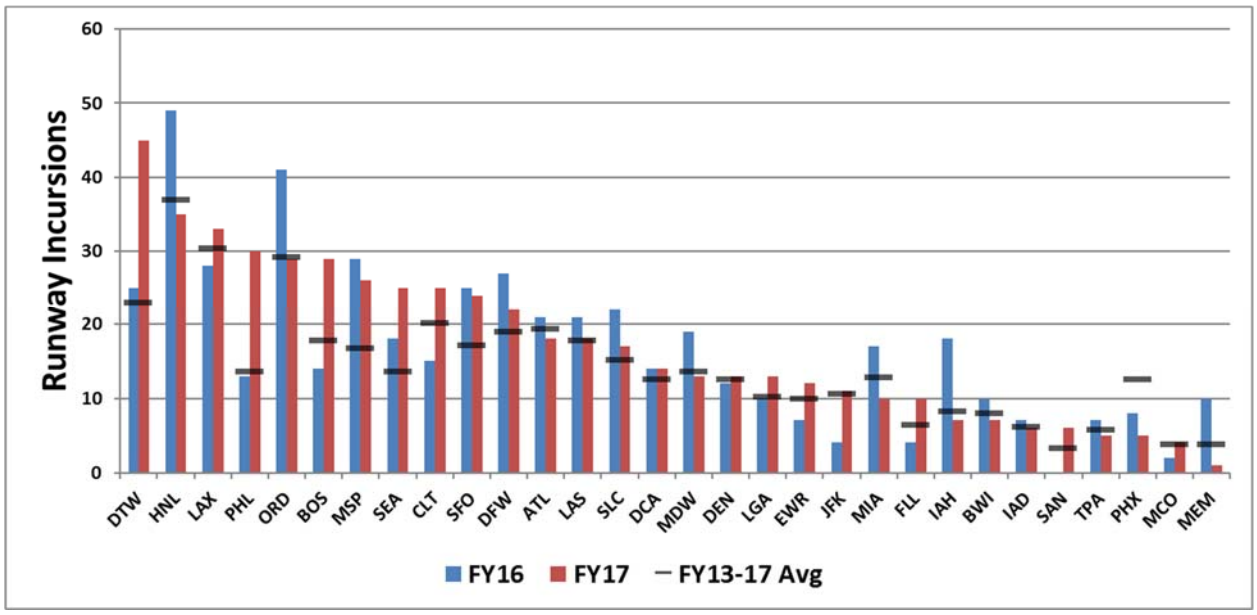
Runway Incursions and Surface Incidents

Incursions by Type

Loss of Standard Separation Count

Runway Incursions and Surface Incidents at Core 30 Airports

A runway incursion is any occurrence involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft. Across all Core 30 airports, the number of runway incursions increased from 497 in FY2016 to 513 in FY2017—an increase of 3.2 percent. The graph and table below show numbers of runway incursions by airport. The highest number of incursions occurred at Detroit (DTW), Honolulu (HNL), Los Angeles (LAX), and Philadelphia (PHL). Incursions by airport and by type appear on the next page. (*See*, Appendix I for explanations of the Core 30 airport codes.)



Core 30 Total Runway Incursions and Surface Incidents			
FY13-17 Avg	**FY16**	**FY17**	**%Change**
431	497	513	3.2%

Airport	FY13-17 Avg	FY16	FY17
ATL	19	21	18
BOS	18	14	29
BWI	8	10	7
CLT	20	15	25
DCA	13	14	14
DEN	13	12	13
DFW	19	27	22
DTW	23	25	45
EWR	10	7	12
FLL	6	4	10
HNL*	37	49	35
IAD	6	7	6
IAH	8	18	7
JFK	11	4	11
LAS	18	21	18

Airport	FY13-17 Avg	FY16	FY17
LAX	30	28	33
LGA	10	10	13
MCO	4	2	4
MDW	14	19	13
MEM	4	10	1
MIA	13	17	10
MSP	17	29	26
ORD	29	41	29
PHL	14	13	30
PHX	13	8	5
SAN	3	0	6
SEA	14	18	25
SFO	17	25	24
SLC	15	22	17
TPA	6	7	5

*Honolulu is coded as HNL or HCF in the source data.

Source: Aviation Safety (AVS), Federal Aviation Administration (accessed from: FAA Aviation Safety Information Analysis and Sharing (ASIAS), Runway Incursion Database (https://www.asias.faa.gov/apex/f?p=100:28:::NO:28::), February 22, 2018).

Incursions by Type at Core 30 Airports, FY2017

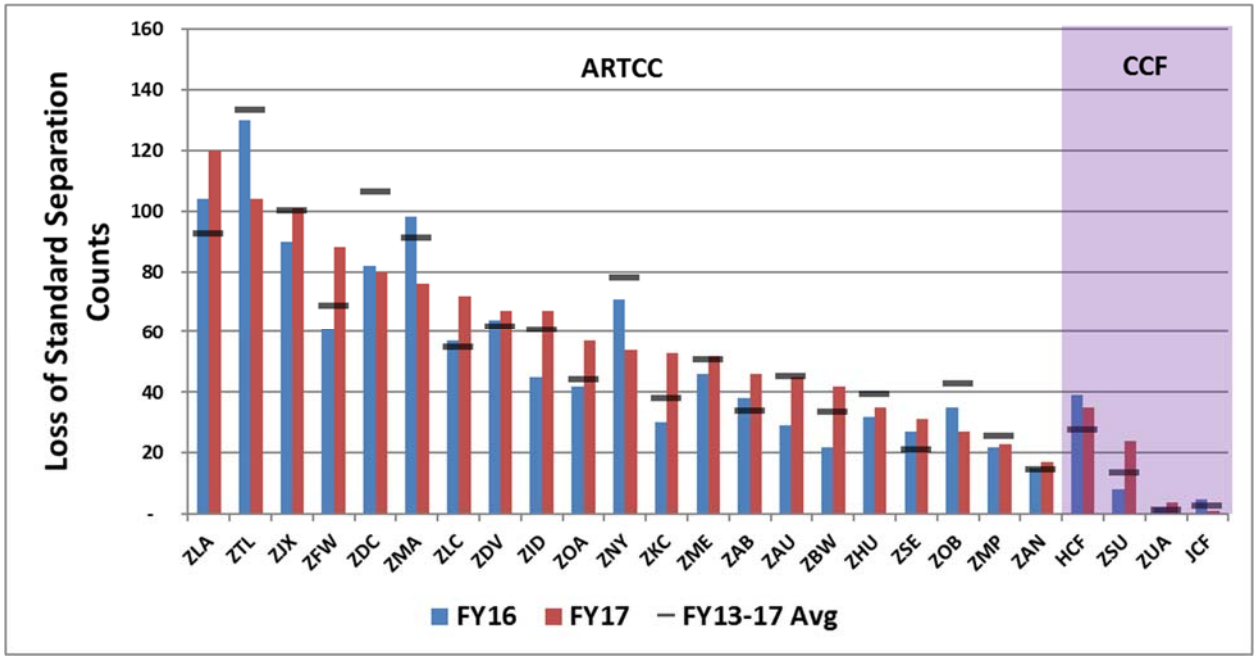
Airport	A	B	C	D	E	P	S	NA
ATL	0	0	12	3	0	0	0	3
BOS	0	0	20	5	0	0	0	4
BWI	0	0	2	3	0	0	0	2
CLT	0	0	13	4	0	0	0	8
DCA	0	0	10	4	0	0	0	0
DEN	0	0	10	0	0	0	0	3
DFW	0	0	11	3	0	0	0	8
DTW	0	0	6	10	0	0	0	29
EWR	0	0	11	1	0	0	0	0
FLL	0	0	5	1	0	0	0	4
HNL	0	0	15	11	0	0	0	9
IAD	0	0	3	3	0	0	0	0
IAH	0	0	4	2	0	0	0	1
JFK	0	0	8	2	0	0	0	1
LAS	0	0	7	5	0	0	0	6
LAX	0	0	24	7	0	0	0	2
LGA	0	0	8	2	0	0	0	3
MCO	0	0	1	0	0	0	0	3
MDW	0	0	9	1	0	0	0	3
MEM	0	0	0	1	0	0	0	0
MIA	0	0	6	3	0	0	0	1
MSP	0	0	23	2	0	0	0	1
ORD	0	0	14	8	0	0	0	7
PHL	0	0	17	11	0	0	0	2
PHX	0	0	2	0	0	0	0	3
SAN	0	0	3	3	0	0	0	0
SEA	0	0	7	4	0	0	0	14
SFO	1	0	14	5	0	0	0	4
SLC	0	0	4	10	0	0	0	3
TPA	0	0	0	4	0	0	0	1

Category A - A serious incident in which a collision was narrowly avoided.
Category B - An incident in which separation decreases and there is a significant potential for collision, which may result in a time critical corrective/evasive response to avoid a collision.
Category C - An incident characterized by ample time and/or distance to avoid a collision.
Category D - An incident that meets the definition of a runway incursion such as incorrect presence of a single vehicle/person/aircraft on the protected area of a surface designated for the landing and take-off of aircraft of aircraft but with no immediate safety consequences.
Category E - An incident in which insufficient or conflicting evidence of the event precludes assigning another category.
Category P - Pending security assessment.
Category S - Not a runway incursion, but a surface incident for which severity is not assessed.
NA - Not available.

Source: Aviation Safety (AVS), Federal Aviation Administration (accessed from: FAA Aviation Safety Information Analysis and Sharing (ASIAS), Runway Incursion Database (https://www.asias.faa.gov/apex/f?p=100:28:::NO:28::), February 22, 2018).

Loss of Standard Separation Count, by Center

Standard separation is a specified separation minima in between airborne aircraft in controlled airspace. Breaches of such minima are based on Airborne Loss Event data. Losses of standard separation are reported by Air Route Traffic Control Center (ARTCC) below. Across all centers, losses of standard separation rose 10.6 percent in FY2017. Three centers with the highest losses of separation were Los Angeles (ZLA), Atlanta (ZTL), and Jacksonville (ZJX). (*See*, Appendix I for explanations of the ARTCC and combined control facilities (CCF).)



Total Losses of Standard Separation			
FY13-17 Avg	FY16	FY17	%Change
1,284	1,194	1,321	10.6%

Center	FY13-17 Avg	FY16	FY17
HCF	28	39	35
JCF	3	5	1
ZAB	34	38	46
ZAN	15	15	17
ZAU	45	29	45
ZBW	34	22	42
ZDC	106	82	80
ZDV	62	64	67
ZFW	69	61	88
ZHU	39	32	35
ZID	61	45	67
ZJX	100	90	101
ZKC	38	30	53

Center	FY13-17 Avg	FY16	FY17
ZLA	93	104	120
ZLC	55	57	72
ZMA	91	98	76
ZME	51	46	52
ZMP	26	22	23
ZNY	78	71	54
ZOA	44	42	57
ZOB	43	35	27
ZSE	21	27	31
ZSU	13	8	24
ZTL	133	130	104
ZUA	1	2	4

Source: Office of Policy and Performance (AJI-3), Air Traffic Organization, Federal Aviation Administration, unpublished Airborne Loss Event data, March 1, 2018.

Other ATO Topics

There are a variety of other aspects of the NAS which are of special interest. The Report presents the following:

Flight Service Stations

Commercial Space Launch Activity

Flight Service Stations

Flight Service Stations (FSS) are air traffic facilities that communicate directly with pilots to conduct preflight briefings, flight plan processing, inflight advisory services, search and rescue initiation, and assistance to aircraft in emergencies. FSS also relay Air Traffic Control clearances, process Notices to Airmen (NOTAMs) and provide updates on aviation meteorological and aeronautical information. All 17 Alaskan flight service stations are Federal facilities and the 6 stations throughout the rest of the country are contracted.

Another service to civil pilots is the Direct User Access Terminal Service (DUATS). DUATS is a weather information and flight plan processing service contracted by the FAA. It is a telephone and internet based system through which pilots can access weather and aeronautical information to help with flight planning.

ALASKA FSS	**Barrow FSS (BRW)** **Cold Bay FSS (CDB)** **Deadhorse FSS (SCC)** **Dillingham FSS (DLG)** **Fairbanks FSS (FAI)** **Homer FSS (HOM)** **Iliamna FSS (ILI)** **Juneau FSS (JNU)** **Kenai FSS (ENA)** **Ketchikan FSS (KTN)** **Kotzebue FSS (OTZ)** **McGrath FSS (MCG)** **Nome FSS (OME)** **Northway FSS (ORT)** **Palmer FSS (LBE)** **Sitka FSS (SIT)** **Talkeetna FSS (TKA)**
ARIZONA FSS	**Prescott LM FSS HUB (PRC)**
DISTRICT OF COLUMBIA FSS	**District of Colum. LM FSS HUB**
FLORIDA FSS	**Miami AIFSS**
MINNESOTA FSS	**Princeton AFSS**
NORTH CAROLINA FSS	**Raleigh-Durham AFSS**
TEXAS FSS	**Fort Worth LM FSS HUB**

FAA Flight Services

FAA Facilities – Alaska Flight Service							
Year	Pilot Briefs	Flight Plans Filed	Preflight Calls	Aircraft Contacts	Airport Advisories	NOTAMs Issued	Total SAR
FY2015	104,535	199,663	62,847	476,336	296,363	175,165	4,778
FY2016	101,510	191,767	56,214	490,342	291,224	131,607	4,653
FY2017	94,553	194,641	52,504	485,847	305,915	135,226	3,662

FAA Facilities – Contracted Services							
Year	Pilot Briefs	Flight Plans Filed	Preflight Calls	Inflight Contacts	Flight Data Calls	NOTAMs Issued	Total SAR
FY2015	1,029,623	719,349	1,727,671	391,632	219,659	251,610	No Data
FY2016	892,170	608,761	1,495,599	326,820	194,712	227,576	3,782*
FY2017	829,909	515,868	1,344,640	314,363	175,203	216,997	8,145

* Data delivered starting May 2016.

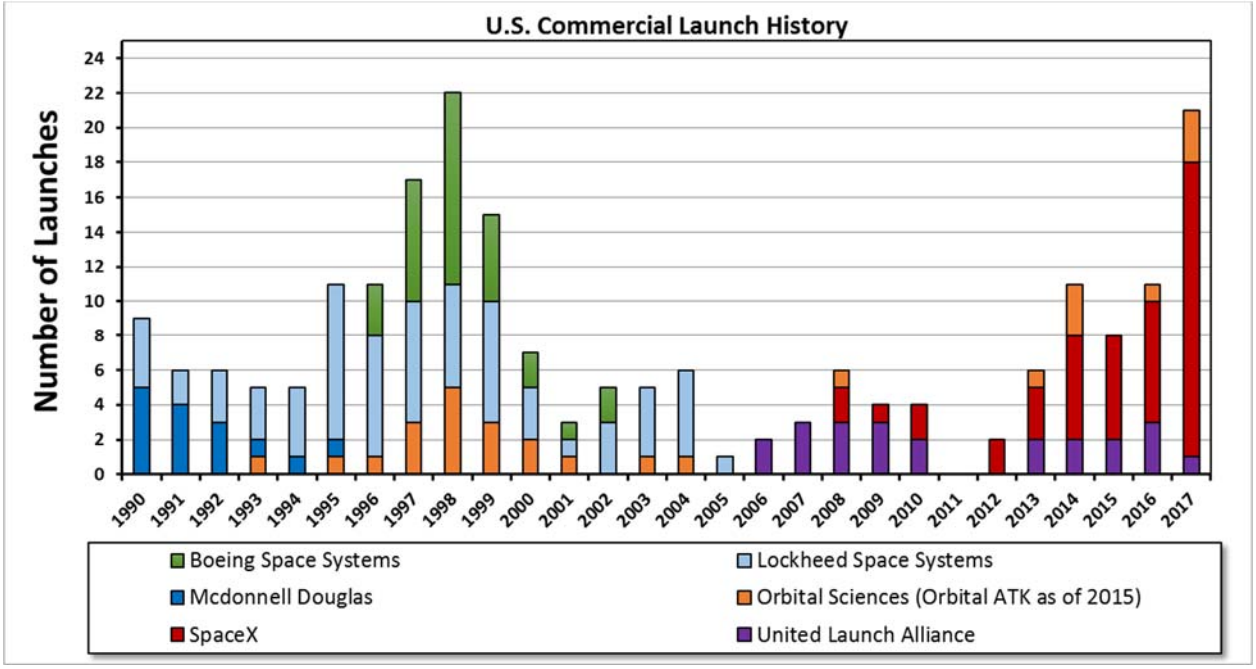
DUATS – Web Services		
Year	Pilot Briefs*	Flight Plans Filed
FY2015	13,117,576	3,130,797
FY2016	17,705,259	3,002,163
FY2017	29,079,619	2,592,214

* Number represents the number of hits to DUATs Web Sites/Portals.

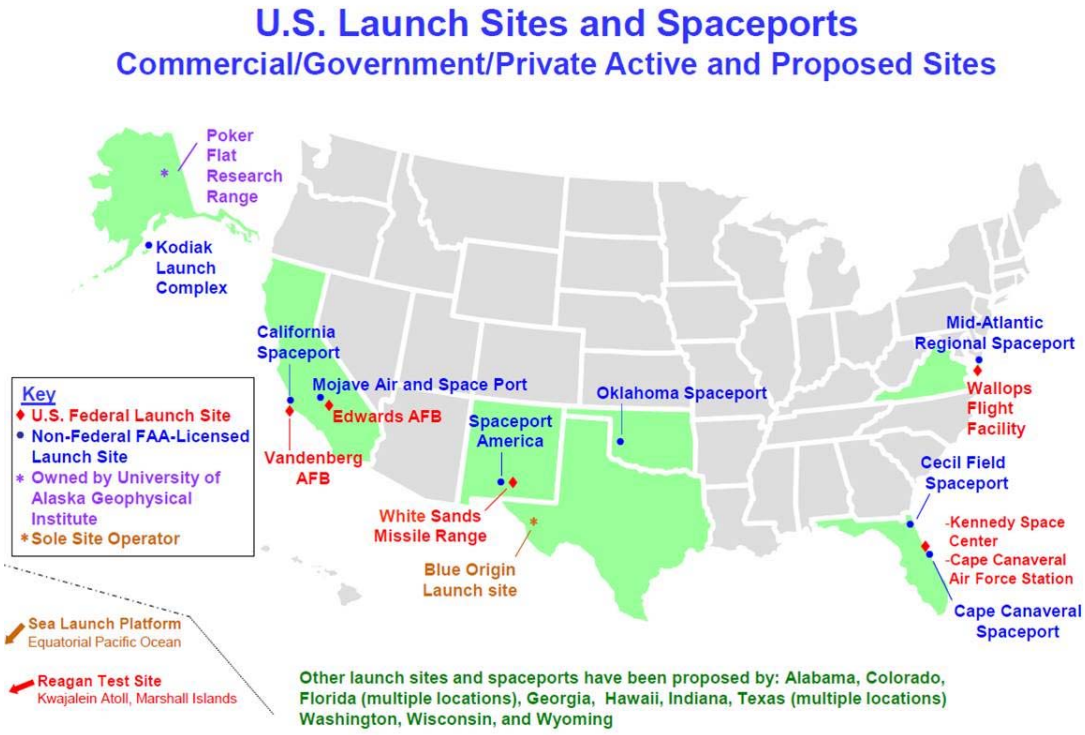
United States NOTAM Office (USNOF)		
Year	Domestic	International
FY2015	1,216,089	561,972
FY2016	1,327,858	603,930
FY2017	1,455,238	760,015

Source: Flight Service (AJR-B), Air Traffic Organization, Federal Aviation Administration, Email communication, March 28, 2018.

Commercial Space Launch Activity



Sources: Commercial Space Transportation (AST), Federal Aviation Administration, The Annual Compendium of Commercial Space Transportation, various years; Commercial Space Transportation (AST), Federal Aviation Administration, Launches. https://www.faa.gov/data_research/commercial_space_data/launches/?type=license; Bureau of Transportation Statistics, U.S. Dept. of Transportation, National Transportation Statistics, Table 1-39, February 5, 2018. https://www.bts.gov/browse-statistical-products-and-data/national-transportation-statistics/nts-2017-4th-quarter



Source: Commercial Space Transportation (AST), Federal Aviation Administration, February 2013.

Appendix I – Facility Codes

Core 30 Airports

Code	Airport	Code	Airport
ATL	Hartsfield-Jackson Atlanta International	LAX	Los Angeles International
BOS	Boston Logan International	LGA	New York LaGuardia
BWI	Baltimore/Washington International	MCO	Orlando International
CLT	Charlotte Douglas International	MDW	Chicago Midway
DCA	Ronald Reagan Washington National	MEM	Memphis International
DEN	Denver International	MIA	Miami International
DFW	Dallas/Fort Worth International	MSP	Minneapolis/St. Paul International
DTW	Detroit Metropolitan Wayne County	ORD	Chicago O`Hare International
EWR	Newark Liberty International	PHL	Philadelphia International
FLL	Fort Lauderdale/Hollywood International	PHX	Phoenix Sky Harbor International
HNL	Honolulu International	SAN	San Diego International
IAD	Washington Dulles International	SEA	Seattle/Tacoma International
IAH	George Bush Houston Intercontinental	SFO	San Francisco International
JFK	New York John F. Kennedy International	SLC	Salt Lake City International
LAS	Las Vegas McCarran International	TPA	Tampa International

Stand-Alone Terminal Radar Control (TRACON) Facilities

LocID	TRACON	LocID	TRACON
A11	Anchorage TRACON	NCT	Northern California TRACON
A80	Atlanta TRACON	P31	Pensacola TRACON
A90	Boston TRACON	P50	Phoenix TRACON
C90	Chicago TRACON	P80	Portland TRACON
D01	Denver TRACON	PCT	Potomac TRACON
D10	Dallas - Ft Worth TRACON	R90	Omaha TRACON
D21	Detroit TRACON	S46	Seattle TRACON
F11	Central Florida TRACON	S56	Salt Lake City TRACON
I90	Houston TRACON	SCT	Southern California TRACON
L30	Las Vegas TRACON	T75	St Louis TRACON
M03	Memphis TRACON	U90	Tucson TRACON
M98	Minneapolis TRACON	Y90	Yankee TRACON
N90	New York TRACON		

Air Route Traffic Control Centers (ARTCC) and Combined Control Facilities (CCF)

LocID	Center	LocID	Center
HCF	Honolulu Control Facility	ZLA	Los Angeles CA ARTCC
JCF	Joshua Tree Control Facility	ZLC	Salt Lake City UT ARTCC
ZAB	Albuquerque NM ARTCC	ZMA	Miami FL ARTCC
ZAN	Anchorage AK ARTCC	ZME	Memphis TN ARTCC
ZAU	Chicago IL ARTCC	ZMP	Minneapolis MN ARTCC
ZBW	Nashua NH ARTCC (Boston)	ZNY	New York NY ARTCC
ZDC	Leesburg VA ARTCC (DC)	ZOA	Oakland CA ARTCC
ZDV	Denver CO ARTCC	ZOB	Cleveland OH ARTCC
ZFW	Fort Worth TX ARTCC	ZSE	Seattle WA ARTCC
ZHU	Houston TX ARTCC	ZSU	San Juan PR Control Facility
ZID	Indianapolis IN ARTCC	ZTL	Atlanta GA ARTCC
ZJX	Jacksonville FL ARTCC	ZUA	Guam Control Facility
ZKC	Kansas City KS ARTCC		

Appendix II – Total Number of IFR Flights in the NAS, FY2009-FY2017

Fiscal Year	Number of Flights
2009	16,428,893
2010	16,522,406
2011	15,992,536
2012	15,760,241
2013	15,576,396
2014	15,546,452
2015	15,782,675
2016	15,724,478
2017	15,800,679

Source: Office of Performance Analysis (AJR-G), Air Traffic Organization, FAA, December 19, 2017.

Glossary of Terms

ADC	*See*, Average Daily Capacity (ADC).
AFP	*See*, Airspace Flow Programs (AFP).
Airport Operations	*See*, Operations.
Airspace Flow Programs (AFP)	Airspace Flow Programs (AFPs) manage demand-capacity imbalances through the issuance of Estimated Departure Clearance Times (EDCT) to flights traversing a Flow Constrained Area (FCA). An AFP might be used, for example, to reduce the rate of flights through a center when that center has reduced en route capacity due to severe weather, replacing Mile-In-Trail (MIT) restrictions for a required reroute, managing airport arrival fix demand or controlling multiple airports within a terminal area.
Air Route Traffic Control Center (ARTCC)	A facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft. Also known as en route or centers. There are 21 ARTCCs in the continental U.S.
ARAC	*See*, Army Radar Approach Control (ARAC).
Army Radar Approach Control (ARAC).	An FAA air traffic control facility using radar and air/ground communications to provide approach control services to aircraft arriving, departing, or transiting the airspace controlled by the facility. Service is provided to both civilian and U.S. Army airports. Currently, the U.S. does not operate any ARACs.
ASM	*See*, Available Seat Miles (ASM).
Available Seat Miles (ASM)	The aircraft miles flown in each inter-airport segment multiplied by the number of seats available for fare paying passenger use on that segment. Available seat miles are computed by summation of the products of the number of miles on each interairport segment multiplied by the number of available seats on that segment.
Average Daily Capacity (ADC)	The Average Daily Capacity, calculated as the sum of the Airport Departure Rates (ADR) and the Capacity Airport Arrival Rates (AAR) divided by the number of days in the period under consideration.
Average Hourly Capacity (Called Rate)	See, Called Rate.
Called Rates	The hourly throughput that an airport's runways are able to sustain during periods of high demand. Called rates include all arrival and departure traffic that an airport can support.
Cancellations	The set of cancelled departures as determined by a combination of scheduled flights not flown and TFMS flight plans that were cancelled and not re-filed for ASPM carriers and all other carriers reporting schedule data; and ASQP flight cancellations.
CCF	*See*, Combined Control Facility (CCF).
Center	Also known as Air Route Traffic Control Center (ARTCC) or En Route. *See*, Air Route Traffic Control Center (ARTCC).
Center Operations	*See*, Operations.
CERAP	*See*, Combined En Route Radar Approach Control (CERAP).
Class B Airspaces	Generally, that airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of IFR operations or passenger enplanements. The configuration of each Class B airspace area is individually tailored and consists of a surface area and two or more layers (some Class B airspace areas resemble upside-down wedding cakes), and is designed to contain all published instrument procedures once an aircraft enters the airspace.
Combined ATCT TRACONs	*See*, Terminal Radar Control Facility (TRACON).
Combined Control Facility (CCF)	An air traffic control facility that provides approach control services for one or more airports as well as en route air traffic control (center control) for a large area of airspace. Some may provide tower services along with approach control and en route services. The U.S. has four CCFs.

Combined En Route Radar Approach Control (CERAP)	An air traffic control facility that combines the functions of an ARTCC with a TRACON facility.
Core 30 Airports	The 30 airports with the highest number of operations.
Delays	*See*, OPSNET Delays.
Diversions	Gate Return / Air Return and en route diversion are considered a diversion. However, a planned stop for fuel, known before departure from the gate, where the flight has been dispatched to is not.
Direct User Access Terminal Service (DUATS)	DUATS, or Direct User Access Terminal Service is a weather information and flight plan processing service contracted by FAA for use by United States civil pilots and other authorized users. The DUAT Service is a telephone- and Internet-based system which allows the pilot to use a personal computer for access to a Federal Aviation Administration (FAA) database to obtain weather and aeronautical information and to file, amend, and cancel domestic IFR and VFR flight plans.
DUATS	*See*, Direct User Access Terminal Service (DUATS).
En Route	Also known as Air Route Traffic Control Center (ARTCC) or, simply, Center. *See*, Air Route Traffic Control Center (ARTCC).
En Route Operations	*See*, Operations.
Flight	The period from the start of the takeoff roll to the first landing.
Flight Service Station (FSS)	A flight service station (FSS) is an air traffic facility that provides information and services to aircraft pilots before, during, and after flights, but unlike air traffic control (ATC), is not responsible for giving instructions or clearances or providing separation.
FSS	See, Flight Service Station (FSS).
GDP	*See*, Ground Delay Programs (GDP).
Go Around	A go-around (sometimes called overshoot) is an aborted landing of an aircraft that is on final approach.
Ground Delay Programs (GDP)	Ground Delay Programs are implemented to control air traffic volume to airports where the projected traffic demand is expected to exceed the airport's acceptance rate for a lengthy period of time. Lengthy periods of demand exceeding acceptance rate are normally a result of the airport's acceptance rate being reduced for some reason. The most common reason for a reduction in acceptance rate is adverse weather such as low ceilings and visibility. How it works: Flights that are destined to the affected airport are issued Expected Departure Clearance Times (EDCT) at their point of departure. Flights that have been issued EDCTs are not permitted to depart until their Expected Departure Clearance Time. These ECDTs are calculated in such a way as to meter the rate that traffic arrives at the affected airport; ensuring that demand is equal to acceptance rate. The length of delays that result from the implementation of a Ground Delay Program depends upon two factors: how much greater than the acceptance rate the original demand was, and for what length of time the original demand was expected to exceed the acceptance rate.
Ground Stops (GS)	Ground Stops are implemented for a number of reasons. The most common reasons are: • To control air traffic volume to airports when the projected traffic demand is expected to exceed the airport's acceptance rate for a short period of time. • To temporarily stop traffic allowing for the implementation of a longer-term solution, such as a Ground Delay Program. • The affected airport's acceptance rate has been reduced to zero. How it works: • Flights that are destined to the affected airport are held at their departure point for the duration of the Ground Stop.
GS	*See*, Ground Stops (GS).
Holdings	Holding (or flying a hold) is a maneuver designed to delay an aircraft already in flight while keeping it within a specified airspace.

IFR flights	Instrument Flight Rules. A set of rules governing the conduct of flight under instrument meteorological conditions.
Level-Offs	Level-offs are tracked from the Top-of-Descent (TOD) point or 200 nautical miles (NM) from the airport, whichever is closer. A trajectory segment is considered as a level-off if the change in altitude of position reports is less than or equal to 200 feet and the segment is at least 50 seconds in duration. The metric is calculated as the sum of the count of level-offs for each flight within a scope (i.e. non-military Instrument Flight Rules (IFR) operations arriving into Core Airports), divided by the total number of flights within the scope. The metric is derived from flight position reports from the National Offload Program (NOP).
Load Factor	The summation of the number of revenue passenger miles (RPM), divided by the summation of the number of available seat miles (ASM), on revenue paying commercial flights. This quotient is expressed as a percentage. *See also*, Available Seat Miles (ASM) and Revenue Passenger Miles (RPM).
Loss of Separation Events	A defined loss of separation between airborne aircraft occurs whenever specified separation minima in controlled airspace are breached. Minimum separation standards for airspace are specified by ATS authorities, based on ICAO standards.
Operations	• Airport operations: The number of arrivals and departures from the airport at which the airport traffic control tower is located. • Tower operations: Airport operations, plus airport tower overflights. • TRACON operations: The number of operations passed to and from area airports or centers, including overflights through TRACON airspace. • En route or center operations: The number of operations passing to and from a TRACON to a center, or from one center to another center, or from a center to a TRACON. It includes U.S. overflights and oceanic traffic through center air space that do not arrive at or depart from U.S. territory.
Overflights	• Terminal overflight: A terminal IFR flight that originates outside the TRACON's/RAPCON's/Radar ATCT's area and passes through the area without landing. • En route overflight: An en route IFR flight that originates outside the ARTCC's area and passes through the area without landing.
OPSNET Delays	Delays to instrument flight rules (IFR) traffic of 15 minutes or more, which result from the ATC system detaining an aircraft at the gate, short of the runway, on the runway, on a taxiway, or in a holding configuration anywhere en route, must be reported. The IFR controlling facility must ensure delay reports are received and entered into OPSNET." These OPSNET delays are caused by the application of initiatives by the Traffic Flow Management (TFM) in response to weather conditions, increased traffic volume, runway conditions, equipment outages, and other causes. Below are descriptions of the categories of delay causes resulting in a reportable delay: • Weather: The presence of adverse weather conditions affecting operations. This includes wind, rain, snow/ice, low cloud ceilings, low visibility, and tornado/ hurricane/thunderstorm. • Volume: Delays must only be reported as volume when the airport is in its optimum configuration and no impacting conditions have been reported when the delays were incurred. • Runway/Taxiway: Reductions in facility capacity due to runway/taxiway closure or configuration changes. • Equipment: An equipment failure or outage causing reduced capacity. • Other: All impacting conditions that are not otherwise attributed to weather, equipment, runway/taxiway, or volume, such as airshow, aircraft emergency, bomb threat, external radio frequency interference, military operations, nonradar procedures, etc. Non-reportable delays are delays incurred by IFR traffic, but which should not be reported in OPSNET.
Radar Approach Control (RAPCON)	An FAA air traffic control facility using radar and air/ground communications to provide approach control services to aircraft arriving, departing, or transiting the airspace controlled by the facility. Service is provided to both civilian and U.S. Air Force airports. Currently, the U.S. does not operate any RAPCONs.
Radar ATC Facility (RATCF)	An FAA air traffic control facility using radar and air/ground communications to provide approach control services to aircraft arriving, departing, or transiting the airspace controlled by the facility. Service is provided to both civilian and U.S. Navy airports. Currently, the U.S. does not operate any RATCFs.
RAPCON	*See*, Radar Approach Control (RAPCON).
RATCF	*See*, Radar ATC Facility (RATCF).

Revenue Passenger Miles (RPM)	One revenue passenger (fare paying passenger) transported one mile. Revenue passenger miles are computed by summation of the products of the revenue aircraft miles on each interairport segment multiplied by the number of revenue passengers carried on that segment.
RPM	*See*, Revenue Passenger Miles (RPM).
Runway Incursions	A Runway Incursion is any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and takeoff of aircraft.
Stand-Alone TRACON	*See*, Terminal Radar Control Facility (TRACON).
Terminal Radar Control Facility (TRACON)	An FAA air traffic control facility using radar and air/ground communications to provide approach control services to aircraft arriving, departing, or transiting the airspace controlled by the facility. A TRACON located in an air traffic control tower is an up down or combined TRACON. A TRACON that does not share a facility is a stand-alone TRACON. The U.S. has 155 civilian TRACONs.
Top-of-Descent (TOD)	Top-of-Descent is the transition from the cruise phase of a flight to the descent phase, the point at which the planned descent to final approach altitude is initiated.
TOD	*See*, Top-of-Descent (TOD).
Tower Operations	*See*, Operations.
TRACON	*See*, Terminal Radar Control Facility (TRACON).
TRACON Operations	*See*, Operations.
VFR	*See*, Visual Flight Rules (VFR).
VFR flights	Flights operated under visual flight rules.
Visual Flight Rules (VFR)	Visual Flight Rules are rules that govern the procedures for conducting flights under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate a type of flight plan.

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