
NextGen Philadelphia International Airport

Philadelphia International Airport (PHL) is the 20th busiest airport in North America in terms of passenger traffic, which increased by 0.8 percent in 2014 to 30.7 million. The number of operations decreased by 3.1 percent in 2014, to 419,253. In 2014, PHL was the 19th busiest airport in North America in terms of cargo volume; 392,506 metric tons of freight and mail moved through its facilities.

American Airlines (and its merger partner US Airways) have the largest share of the average daily operations at the airport.

All airport information shown above is reported by Calendar Year (CY).

NextGen Capabilities

Adapted for Adjacent Center Metering (ACM)

8/2008

Approved for FAA Order JO 7110.308

11/2008

Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)

5/2009

Required Navigation Performance (RNP) Authorization Required (AR) Approaches

9/2009

Airport Surface Detection Equipment- Model X (ASDE-X)

FY 2010

Area Navigation (RNAV) Standard Instrument Departures (SIDs)

2/2010

Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)

6/2010

Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)

7/2010

External Surface Data Release

FY 2011

Area Navigation (RNAV) Global Positioning System (GPS) Approaches

8/2011

Expanded Low-Visibility Operations Using Lower Runway Visual Range (RVR) Minima

CY 2012

New York Airspace Redesign

5/2012

Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)

5/2012

Automated Terminal Proximity Alert (ATPA) Phase 1

3/2013

Deployment of Time Based Flow Management (TBFM)

by 8/2013

Wake Turbulence Mitigation for Arrivals-Procedures (WTMA-P) for Heavy / 757 Aircraft

CY 2015

Situational Awareness and Alerting of Ground Vehicles

5/2015

Departure Clearance Tower Service Initial Operating Capability

CY 2016

- Featured capabilities have extended descriptions.

This timeline reflects programmatic milestones, and excludes capabilities implemented across the National Airspace System.

Information as of September 29, 2016.

Adapted for Adjacent Center Metering (ACM)

[Read](#) how ACM is used in other locations in the National Airspace System.

Approved for FAA Order JO 7110.308

[View](#) FAA Order 7110.308A.

Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)

Read about Performance Based Navigation and RNAV in the [2016 NextGen Update](#).

Required Navigation Performance (RNP) Authorization Required (AR) Approaches

[Read](#) how RNP Approaches are used at other locations in the National Airspace System.

Airport Surface Detection Equipment- Model X (ASDE-X)

Learn more about surface surveillance capabilities in the [2016 NextGen Update](#).

[Read](#) how ASDE-X is used at other locations in the National Airspace System.

Area Navigation (RNAV) Standard Instrument Departures (SIDs)

View a [training video](#) for using the RNAV SID phraseology.

Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)

Read about Performance Based Navigation and RNAV in the [2016 NextGen Update](#).

Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)

Read about Performance Based Navigation and RNAV in the [2016 NextGen Update](#).

External Surface Data Release

[Read](#) how surface data sharing is used at other locations in the National Airspace System.

Area Navigation (RNAV) Global Positioning System (GPS) Approaches

[Read](#) how RNAV Approaches and other NextGen technology are used at other locations in the National Airspace System.

Expanded Low-Visibility Operations Using Lower Runway Visual Range (RVR) Minima

[Read](#) how expanded low visibility operations have impacted the National Airspace System.

New York Airspace Redesign

[Read](#) more about the background of the New York/New Jersey/Philadelphia Airspace Redesign.

Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)

Read about Performance Based Navigation and RNAV in the [2016 NextGen Update](#).

Automated Terminal Proximity Alert (ATPA) Phase 1

[Read](#) how ATPA can help operations across the National Airspace System.

Deployment of Time Based Flow Management (TBFM)

What is Time Based Flow Management?

Time Based Flow Management (TBFM) is a capability used to manage traffic flows by metering, or sequencing aircraft to their arrival airports. Through TBFM, an automation system uses a schedule of runway assignments and landing times to sequence inbound flights, and allocates delays to various segments of each flight in order to meet the assigned schedule. TBFM is administered by traffic managers at the Air Route Traffic Control Center (ARTCC) or Terminal Radar Approach Control facility of the arrival airport. For some airports, TBFM is used routinely, while at others it is used as needed.

TBFM provides four time-based metering functions:

- Arrival management/situational awareness to inform traffic managers of projected arrival demand
- Airborne metering to sequence flights and provide controllers with allocated delay assignments for each flight to meet the proposed schedule
- Departure scheduling to provide increased management of arrival demand by assigning delays to flights at their origin airports to help them merge into the arrival stream
- En route departure capability (EDC) to efficiently integrate departures into overhead en route streams

TBFM enables the more efficient use of available capacity by tailoring the allocation of delays to individual flights, thereby reducing the need for less efficient "one-size-fits-all" techniques such as Miles-in-Trail (MIT) restrictions. In turn, this can reduce total aircraft delays, and transfer delays to more fuel-efficient phases of flight, such as on the ground or at higher altitudes. Importantly, the transfer of delays out of the terminal approach area positions inbound flights to take advantage of Optimized Profile Descent procedures, where these have been implemented. The use of TBFM varies significantly by location, reflecting differences in operating environments and air traffic management strategies.

A predecessor of TBFM called Traffic Management Advisor (TMA) was developed and implemented in the 1990s. TMA was deployed at all 20 ARTCCs by 2007, and was modernized as TBFM in 2013 as a result of a major system re-architecture.



Time Based Flow Management

How is TBFM used for Philadelphia?

For arrivals to Philadelphia International Airport (PHL), Time Based Flow Management (TBFM) is used for arrival management, airborne metering, departure scheduling in arrival flow, and en route departure scheduling. TBFM is generally used during periods of high demand. It is used by each

facility for various lengths of time, some more frequently and for longer durations than others. TBFM use is managed by PHL's Terminal Radar Approach Control (TRACON) facility. The Cleveland and Boston Air Route Traffic Control Centers (ARTCC), ZOB and ZBW respectively, schedule departures and provide airborne metering when needed. PHL TRACON schedules the New York ARTCC (ZNY) and Washington, DC ARTCC (ZDC) departures, while occasionally second tier facilities such as Indianapolis ARTCC (ZID) and Jacksonville ARTCC (ZJX) provide Miles-in-Trail support through the use of the en route departure capability.

The use of time-based metering with Traffic Management Advisor for PHL arrivals predates the NextGen program. However, the deployment of the modernized TBFM system in 2013 provided technical enhancements and a platform for additional operational benefits at PHL and other airports.

How did it impact operations?

The FAA conducted an operational assessment of two Time Based Flow Management (TBFM) functions, airborne metering and departure scheduling, at eight airports (four per function) where these are used widely, including Philadelphia International Airport (PHL). The locations were selected based on how frequently each function is used alone and in combination, so the impact of each function could be measured. For this reason, results cannot be interpreted to be representative of impacts at other locations.

For each function, the assessment looked at the impact on both arrival delays and airborne delays as indicators of how efficiently available capacity was used. The FAA's assessment of flights between July 2011 and December 2013 found:

For three of four airports studied that use Departure Scheduling, arrivals tended to experience 1.0 to 1.3 minutes less of arrival delay when the facility was using TBFM to schedule departures. With few exceptions, departure scheduling also significantly reduced the variability of delays. There is an 8 to 10-minute difference between the average arrival delay for metered flights and those subject to Miles-in-Trail (MIT) restrictions alone, for the four airports studied. It is unclear, however, how much of this difference can be attributed exclusively to TBFM because much of the difference occurs on the ground, and there could be other contributing factors. Metered flights experienced about a minute less airborne delay than those subject to MIT restrictions, as well as less extreme and more predictable airborne delays.

Click [here](#) for a full description of the NextGen Operational Performance Assessment.

What is the value of this improvement?

The FAA estimates that the combined reductions in aircraft delays for the eight airports evaluated translated to about \$640 million in savings between 2011 and 2014 (expressed in 2015 dollars). These savings reflect reduced operating costs to airlines of \$209 million, and time savings to passengers valued at over \$430 million. The estimate applies the average observed per-flight delay savings to the base of arrivals managed by airborne metering or departure scheduling in accordance with the FAA's performance assessment.

Where else is it implemented?

Time Based Flow Management (TBFM) is deployed at 93 facilities across the National Airspace System (NAS), including 20 en route, 28 terminal, and 45 tower facilities. It is deployed at all but two of the Core 30 airports, with Tampa International Airport (TPA) and Honolulu International Airport (HNL) as the two exceptions.

Read how Time Based Flow Management (TBFM) is used at other locations in the National Airspace System.

Additional information available on the [NextGen Portfolio pages](#).

Situational Awareness and Alerting of Ground Vehicles

[Read](#) more about System Wide Information Management (SWIM).

Departure Clearance Tower Service Initial Operating Capability

[Read](#) more about Data Comm in the [2016 NextGen Update](#).

Scorecard

The following metrics summarize performance over a large set of diverse operations at this location. As such, their purpose is to reflect general trends as experienced by aircraft operators and passengers, without regard to their underlying drivers. For this reason, metric values should not be compared to operational impacts attributed to specific NextGen capabilities, where these are provided.

Reportable Hours for PHL

07:00 - 21:59 local time

All Information below is in Fiscal Years (October 1 - September 30).

[Efficiency](#)

[Capacity](#)

Efficiency Performance Indicators

Performance Indicator (FY)	2009	2010	2011	2012	2013	2014	2015
Average Gate Arrival Delay <i>Minutes per Flight</i> During reportable hours, the yearly average of the difference between the Actual Gate-In Time and the Scheduled Gate-In Time for flights to the selected airport from any of the ASPM airports. The delay for each fiscal year (FY) is calculated based on the 0.5 th — 99.5 th percentile of the distributions for the year. Flights may depart outside reportable hours, but must arrive during them. The reportable hours vary by airport.	6.9	1.5	4.1	-0.1	5.0	4.0	3.7
Average Number of Level-offs per Flight <i>Counts per Flight</i> The count of level-offs as flights descend from cruise altitudes to the arrival airport, averaged for the fiscal year.	1	1	3.9	3.9	4.0	4.0	4.1
Distance in Level Flight from Top of Descent to Runway Threshold <i>Nautical Miles per Flight</i> The distance flown during level-off segments as flights descend from cruise altitudes to the arrival airport, averaged for the fiscal year (FY).	1	1	65.5	64.6	63.0	61.7	61.9
Effective Gate-to-Gate Time <i>Minutes per Flight</i> During reportable hours, the difference between the Actual Gate-In Time at the destination (selected) airport and the Scheduled Gate-Out Time at the origin airport. Flights may depart outside reportable hours, but must arrive during them. The reportable hours vary by airport and the results are reported by fiscal year (FY).	157.3	156.1	156.6	159.0	165.3	166.8	168.9

<p align="center">Taxi-In Time <i>Minutes per Flight</i></p> <p>During reportable hours, the yearly average of the difference between Wheels-On Time and Gate-In Time for flights arriving at the selected airport from any of the Aviation System Performance Metrics (ASPM) airports. Flights may depart outside reportable hours, but must arrive during them. The reportable hours vary by airport.</p>	7.5	7.3	6.9	6.5	6.4	6.5	6.6
<p align="center">Taxi-Out Time <i>Minutes per Flight</i></p> <p>During reportable hours, the yearly average of the difference between Gate-Out Time and Wheels-Off Time for flights from the selected airport to any of the ASPM airports. Flights must depart during reportable hours, but may arrive outside them. The reportable hours vary by airport.</p>	24.6	22.7	22.4	20.9	21.7	22.0	22.3
<p>¹ Consistent data for the time period prior to FY 2011 are not available.</p>							

As described by the International Civil Aviation Organization (ICAO), *efficiency addresses the operational and economic cost-effectiveness of gate-to-gate flight operations from a single-flight perspective. In all phases of flight, airspace users want to depart and arrive at the times they select and fly the trajectory they determine to be optimum.*

Capacity Performance Indicator

Performance Indicator (FY)	2009	2010	2011	2012	2013	2014	2015
<p align="center">Average Daily Capacity <i>Number of Operations</i></p> <p>During reportable hours, the average daily sum of the Airport Departure Rate (ADR) and Airport Arrival Rate (AAR) reported by fiscal year (FY). The reportable hours vary by airport.</p>	1,470	1,558	1,592	1,616	1,564	1,519	1,473
<p align="center">Average Hourly Capacity During Instrument Meteorological Conditions (IMC) <i>Number of Operations</i></p> <p>The average hourly capacity reported during IMC weather conditions (as defined by ASPM). Capacity is defined as the sum of Airport Departure Rate (ADR) and Airport Arrival Rate (AAR). It is calculated based on the reportable hours at the destination airport. The reportable hours vary by airport.</p>	80	78	78	81	75	71	71

As described by the International Civil Aviation Organization (ICAO): *The global Air Traffic Management (ATM) system should exploit the inherent capacity to meet airspace user demands at peak times and locations while minimizing restrictions on traffic flow. ICAO also notes: The ATM system must be resilient to service disruption and the resulting temporary loss of capacity.*

Additional Links

[NextGen Implementation Plan](#)