NextGen Newark Liberty International Airport

Newark Liberty International Airport (EWR) is the 16th busiest airport in North America in terms of passenger traffic, which grew by 1.7 percent in 2014 to reach 35.6 million. In 2014, there were 395,524 operations at EWR, a 4.4 percent decrease compared to 2013. EWR is the overnight small package center for the New York and New Jersey region. 639,930 metric tons of cargo passed through its facilities in 2014, a decrease of 2 percent from the previous year. EWR is a hub for United Airlines and accounts for the majority of passenger traffic. In addition to NextGen activities, there has also been airspace redesign work in the Newark area.

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

NextGen Capabilities

Area Navigation (RNAV) Global Positioning System (GPS) Approaches
1/2006
Area Navigation (RNAV) Global Positioning System (GPS) Approaches
4/2006
Adapted for Adjacent Center Metering (ACM)
4/2008
Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)
5/2009
Required Navigation Performance (RNP) Authorization Required (AR) Approaches
5/2009
Airport Surface Detection Equipment- Model X (ASDE-X)
7/2009
Area Navigation (RNAV) Standard Instrument Departures (SIDs)
10/2009
Area Navigation (RNAV) Standard Instrument Departures (SIDs)
6/2010
External Surface Data Release
FY 2011
Expanded Low-Visibility Operations Using Lower Runway Visual Range (RVR) Minima
5/2011
Ground Based Augmentation System (GBAS) Category I Non-Federal System Approval
9/2012
Expanded Low-Visibility Operations Using Lower Runway Visual Range (RVR) Minima
5/2013
Deployment of Time Based Flow Management (TBFM)
by 8/2013
Wake Re-Categorization Phase 1 — Aircraft Re-Categorization
3/2015
Departure Clearance Tower Service Initial Operating Capability
Q1 2016
Converging Runway Display Aid (CRDA)
12/2009
New York Airspace Redesign
5/2012
Advanced Electronic Flight Strips (AEFS)
4/2016
Approved for FAA Order JO 7110.308
9/2010

- Featured capabilities have extended descriptions.

This timeline reflects programmatic milestones, and excludes capabilities implemented across the

National Airspace System.

Information as of September 15, 2016.

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.

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.

Adapted for Adjacent Center Metering (ACM)

Read how ACM is used at Newark Liberty International Airport.

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 airport. 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
En route departure capability 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 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.

 Time Based Flow Management

How is TBFM used for Newark?

At Newark Liberty International Airport (EWR), airborne metering and departure scheduling are

routinely used to manage arrivals. While Time Based Flow Management (TBFM) is usually administered by the Air Route Traffic Control Center that overlies the arrival airport, TBFM for Newark is controlled by the New York Terminal Radar Approach Control (TRACON) facility (N90). Airborne metering to the TRACON boundary and departure scheduling for Newark are handled by a combination of Washington Center (ZDC), Cleveland Center (ZOB), Boston Center (ZBW), and New York Center (ZNY).

Newark implemented Traffic Management Advisor, the predecessor to TBFM, in the summer of 2008, and initially used it to conduct time-based metering for about four hours a day. After developing proficiency through 2009, the use of metering was expanded from approximately 10 a.m. to 8 p.m., local time. Today, both airborne metering and departure scheduling at EWR are applied for about 8 hours a day. The deployment of the modernized TBFM system in 2013 provided technical enhancements and a platform for additional operational benefits across the National Airspace System.

When was it implemented?

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

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 techniques are widely used, including Newark Liberty International Airport, due to its routine use of airborne metering. 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 the 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 delays 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, beyond the immediate scope of TBFM's influence.
- Metered flights also experienced about a minute less airborne delay — about 4 minutes at EWR — 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.

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 Instrument Departures (SIDs)

View a training video for using the RNAV SID phraseology.

External Surface Data Release

Read how surface data sharing is 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.

Ground Based Augmentation System (GBAS) Category I Non-Federal System Approval

Read more about Ground Based Augmentation System (GBAS) 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.

Wake Re-Categorization Phase 1 — Aircraft Re-Categorization

Read more about Wake Re-Categorization in the 2016 NextGen Update.

Departure Clearance Tower Service Initial Operating Capability

Read more about Data Comm in the 2016 NextGen Update.

New York Airspace Redesign

Read more about the background of the New York/New Jersey/Philadelphia Airspace Redesign.

Advanced Electronic Flight Strips (AEFS)

Read about decision support systems in the 2016 NextGen Update.

Approved for FAA Order JO 7110.308

View FAA Order 7110.308A.

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 EWR
07:00 - 22:59 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 *Minutes per Flight* **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 0.5th — 99.5th percentile of the distributions for the year. Flights may depart outside reportable hours, but must arrive during them. The reportable hours vary by airport.**	7.4	2.2	5.7	4.5	3.5	1.0	0.8
Average Number of Level-offs per Flight *Counts per Flight* **The count of level-offs as flights descend from cruise altitudes to the arrival airport, averaged for the fiscal year.**	[1]	[1]	4.2	4.3	4.3	4.2	4.1

Distance in Level Flight from Top of Descent to Runway Threshold *Nautical Miles per Flight* **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]	62.1	63.9	63.9	62.9	62.0
Effective Gate-to-Gate Time *Minutes per Flight* **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).**	181.9	169.9	173.8	173.7	173.9	179.9	175.1
Taxi-In Time *Minutes per Flight* **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.**	9.5	8.9	9.2	9.3	8.9	9.0	9.9
Taxi-Out Time *Minutes per Flight* **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.**	28.4	22.2	21.7	21.8	21.4	22.0	20.5

[1] Consistent data for the time period prior to FY 2011 are not available.

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
Average Daily Capacity *Number of Operations* **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.**	1,290	1,294	1,261	1,250	1,265	1,244	1,271
Average Hourly Capacity During Instrument Meteorological Conditions (IMC) *Number of Operations* **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.**	73	74	70	72	75	68	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