NextGen Ronald Reagan Washington National Airport

Ronald Reagan Washington National Airport (DCA) is the 27th busiest airport in North America in terms of passenger traffic, which grew 1.9 percent in 2014 to reach 20.7 million. The number of movements decreased in 2014 by 3.2 percent to 283,174. In 2014, American Airlines (and its merger partner US Airways) held the largest share of the average daily operations at the airport, followed by Delta Air Lines and Southwest Airlines.

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

NextGen Capabilities

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)
7/2010
External Surface Data Release
FY 2011
Area Navigation (RNAV) Standard Instrument Departures (SIDs)
3/2011
Automated Terminal Proximity Alert (ATPA) Phase 1
4/2012
Optimized Profile Descents (OPDs)
7/2012
Deployment of Time Based Flow Management (TBFM)
by 8/2013
Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)
11/2014
Optimized Profile Descents (OPDs)
3/2015
Expanded Low-Visibility Operations Using Lower Runway Visual Range (RVR) Minima
3/2015
Area Navigation (RNAV) Standard Instrument Departures (SIDs)
4/2015
Area Navigation (RNAV) Global Positioning System (GPS) Approaches
8/2015
Area Navigation (RNAV) Standard Instrument Departures (SIDs)
10/2015
DC Metroplex *
6/2015

* The DC Metroplex Project included:

Area Navigation (RNAV) Standard Instrument Departures (SIDs)
Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)
Optimized Profile Descents (OPDs)

- Featured capabilities have extended descriptions.

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

Information as of July 13, 2016.

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.

Required Navigation Performance Authorization Required (RNP AR) Approaches

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.

External Surface Data Release

Read how surface data sharing is used at other locations in the National Airspace System.

Automated Terminal Proximity Alert (ATPA) Phase 1

Read how ATPA can help operations across the National Airspace System.

Optimized Profile Descents

What are Optimized Profile Descents?

Conventional arrival procedures — the published routes and instructions that guide aircraft to the runway — are constrained by the availability and proximity of ground-based navigation aids. The advent of more precise Area Navigation (RNAV) technologies based on GPS eliminated this constraint and enabled the design of more efficient arrival procedures.

Optimized Profile Descents (OPDs) are a type of RNAV arrival procedure that aims to reduce the number of altitude step-descents that were commonly flown in the past. OPD procedures can be used by arrival aircraft to facilitate descent from cruise altitude at or near idle power, eliminating the need for fuel-sapping changes to power settings. This allows aircraft to fly longer at more fuel-efficient cruise altitudes before initiating the descent to their final destination. While step-descents may still be required for safe aircraft merging and sequencing, OPDs can reduce the time aircraft spend in level flight and shift level flight to higher, more fuel efficient altitudes.

 Performance Based Navigation

How is OPD used in Washington, D.C.?

Two Area Navigation (RNAV) Optimized Profile Descent (OPD) arrival procedures were implemented and first used at Ronald Reagan National Airport (DCA) on August 6, 2012, as part of the Washington, D.C. Metroplex project. These procedures, named "FRDMM1" and "TRUPS1," replaced an existing RNAV arrival procedure into DCA. A third OPD procedure, "GIBBZ1," replaced an existing RNAV arrival procedure into neighboring Washington Dulles International Airport (IAD). The new procedures separated arrival flows approaching DCA and IAD from the west to accommodate the lateral separation needed for more fuel efficient descents into both airports. The placement of the FRDMM1 procedure eased the integration of departures from DCA and IAD, allowing aircraft from both airports to climb unrestricted into en route airspace. Similarly, the placement of the TRUPS1 procedure provided additional airspace for sequencing westbound departures from DCA and IAD. These changes produced more direct routes with fewer interactions between operations at these airports. In addition to shortening flight paths in terminal airspace, the procedures reduced the number of level-offs during descent, which are inefficient.

Video: New Arrivals into Washington and Baltimore

To play this video, upgrade to a web browser that supports HTML5 video.

Download Video: New arrivals into Washington and Baltimore (MP4)

How did it impact operations?

Following the implementation of Optimized Profile Descent (OPD) procedures at Ronald Reagan National Airport (DCA), the FAA saw an increase in the use of the west RNAV arrival procedures, rising from 32 percent to 78 percent of DCA arrivals. The average distance and time flown within 250 nautical miles of DCA decreased by 2 miles and 30 seconds, respectively, for flights approaching from the west. The impacts were more pronounced in Instrument Meteorological Conditions (IMC), where average distance and time decreased by almost 8 miles (3 percent) and over 2 minutes (5 percent), respectively.

The improvements in vertical flight efficiency were also pronounced. After the implementation of the new OPD procedures, the average number of fuel-sapping level offs during descent decreased 18 percent for DCA arrivals from the west, in all conditions. Similarly, the distance and time in level flight during descent — where fuel consumption is high — decreased almost 14 miles and 2.5 minutes per flight (18 miles and 3.4 minutes for flights in IMC).

The FAA also performed a comprehensive assessment of OPD procedures implemented in FY 2013 which spanned 11 airports (excluding DCA). That study found significant improvement in the efficiency of descents by airport arrivals. Specifically, it observed two significant impacts that indicated improved fuel efficiency:

- Aircraft were 5 percent more likely to perform continuous descents.
- Flights that conducted step-descents did so more efficiently, exhibiting:
  - An 8 percent reduction in the average number of level segments. This reflects fewer step-descents, which translates to less fuel and fewer communication exchanges between pilots and controllers to safely manage arrival flows.
  - A 6 percent reduction in the average time and distance in level flight. This reflects more time in continuous descent, which is more fuel efficient than level flight.
  - A 5 percent increase in the average altitude in level flight. Aircraft are generally more fuel efficient at higher altitudes.

Not surprisingly, these improvements tended to be greater at airports where the new OPDs could

be used by a higher proportion of arrivals.

Click here for a full description of the NextGen Operational Performance Assessment.

What is the value of this improvement?

While the FAA did not monetize the specific impacts of Optimized Profile Descents (OPDs) at Ronald Reagan Washington National Airport, it estimates the observed efficiency gains from the 41 OPDs at 11 airports implemented in FY 2013 translated to $4 million in fuel cost savings to aircraft operators between 2013 and 2014. These savings, expressed in 2015 dollars, apply only to the share of flights at each of the airports that were in position to use the newly implemented OPD procedures. FAA monetized the observed reductions in level flight time using fleet-specific cost factors that reflect the lower fuel burn associated with idle descent.

Where else is it implemented?

As of March 31, 2016, there are a total of 225 active Optimized Profile Descent (OPD) procedures at 116 airports in the National Airspace System.

Additional information available on the NextGen Portfolio pages.

Deployment of Time Based Flow Management (TBFM)

Read how TBFM is used at other locations in the National Airspace System.

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

Read about Performance Based Navigation and RNAV in the 2016 NextGen Update.

Optimized Profile Descents (OPDs)

Learn more about Optimized Profile Descents (OPDs) in the 2016 NextGen Update.

Read how OPDs are helping aircraft operators throughout the National Airspace System.

Area Navigation (RNAV) Standard Instrument Departures (SIDs)

View a training video for using the RNAV SID phraseology.

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) Standard Instrument Departures (SIDs)

View a training video for using the RNAV SID phraseology.

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

Read how expanded low visibility operations have impacted the National Airspace System.

DC Metroplex *

Read about the Metroplex Program 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 DCA
06:00 - 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 *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.**	1.7	0.6	3.0	1.0	3.5	2.1	1.7
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]	3.5	3.5	3.1	3.0	3.0
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]	53.9	53.2	48.9	47.0	47.6
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).**	117.7	119.8	121.8	122.5	130.5	131.0	133.2
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.**	5.2	5.4	5.6	5.1	5.2	5.4	5.7

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.**	17.9	17.7	18.0	17.3	18.6	18.5	18.8

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.**	1,087	1,074	1,078	1,056	1,065	1,042	1,046
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.**	65	63	63	62	62	59	59

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

View City Pairs Data