

# NextGen Update

May 2017



## Aeronautics and Space Engineering Board

Presented by

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Federal Aviation Administration

# FAA Air Traffic Management Transformations Underway

## Past Practices

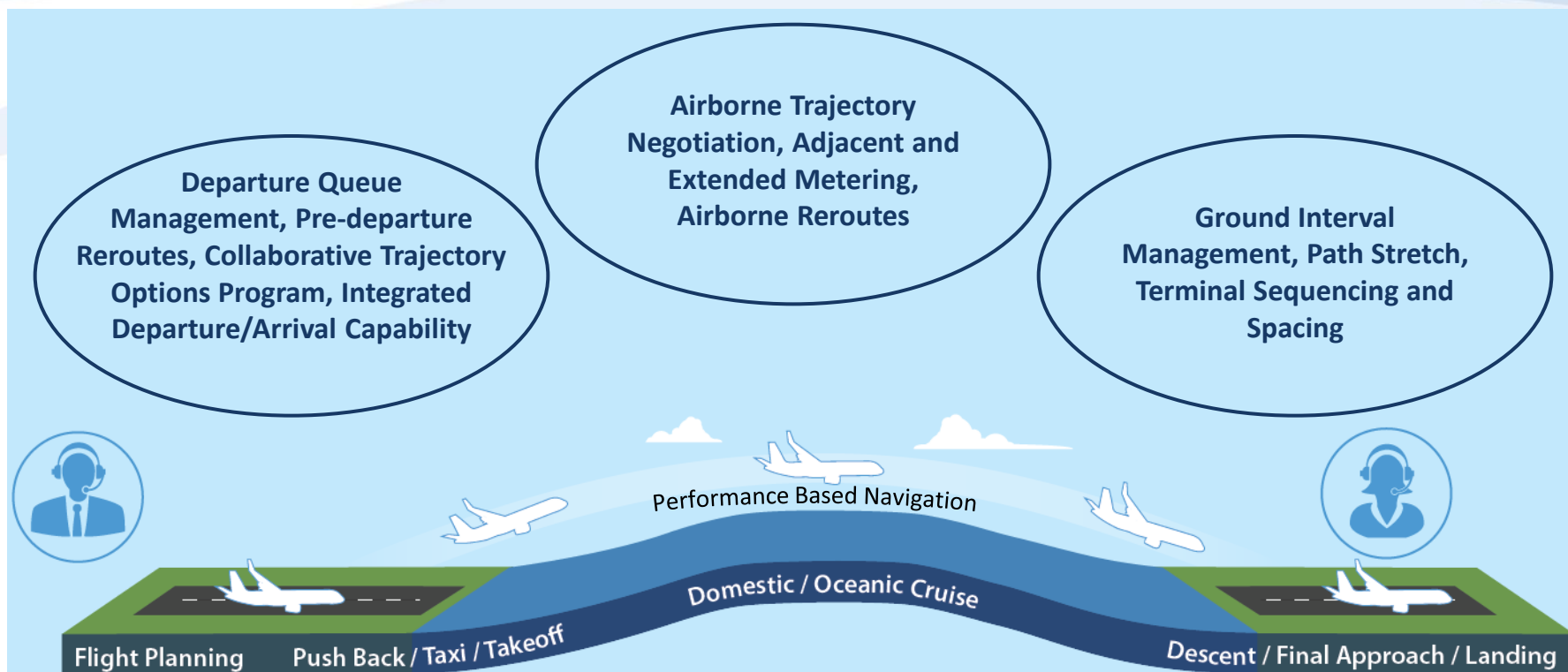
- **Aircraft Routes:** Routing limited by ground-based navigational infrastructure
- **Aircraft Location:** Future time and position of the aircraft not known by all parties\*
- **Information:** Controllers and operators do not have same information to inform decisions
- **Communications:** Controllers communicate by voice to each individual aircraft
- **NAS Efficiency and Traffic Flow:** Operational choke points across phases of flight
- **Operations:** Tactical and reactive air traffic control

## NextGen Improvements

- **Aircraft Routes:** More efficient flight routes and aircraft performance based procedures using GPS navigation
- **Aircraft Location:** Future intended time and position of aircraft known for optimal flight and traffic flow
- **Information:** Shared information (e.g., weather, traffic, system status) for collaborative decision-making
- **Communications:** Controllers communicate via digital messages to multiple aircraft at a time
- **NAS Efficiency and Traffic Flow:** Operations integrated across phases of flight for gate-to-gate efficiency
- **Operations:** Strategic air traffic management

\*Operators, aircrews, pilots, dispatchers, controllers, operations centers and traffic managers

# Delivering NextGen Improvements



## Communication, Navigation, Surveillance, Information Sharing, Weather

National Airspace System (NAS) Voice System (NVS), Data Communications (Data Comm), Automatic Dependent Surveillance-Broadcast (ADS-B), System Wide Information Management (SWIM), Common Support Services-Weather (CSS-Wx), NextGen Weather Processor (NWP)

## Foundational Infrastructure

Terminal Flight Data Manager (TFDM)\*, Time Based Flow Management (TBFM) Traffic Flow Management System (TFMS), Terminal Automation Modernization and Replacement (TAMR), En Route Automation Modernization (ERAM)

\* TFDM is the only foundational infrastructure program fully funded by NextGen

# Path to Trajectory Based Operations (TBO)

*Managing aircraft based on where they will be at “critical points in time”*

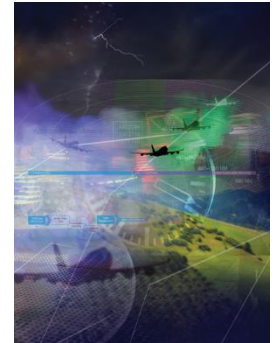
**Trajectory Based Operations** is an air traffic management (ATM) concept to operate the NAS based on the aircraft's ability to fly precise paths in time/space, and air navigation service provider's ability to strategically manage and optimize trajectories throughout the operation.

## Two Key Elements of TBO:

1. Time-Based Management
2. Performance Based Navigation

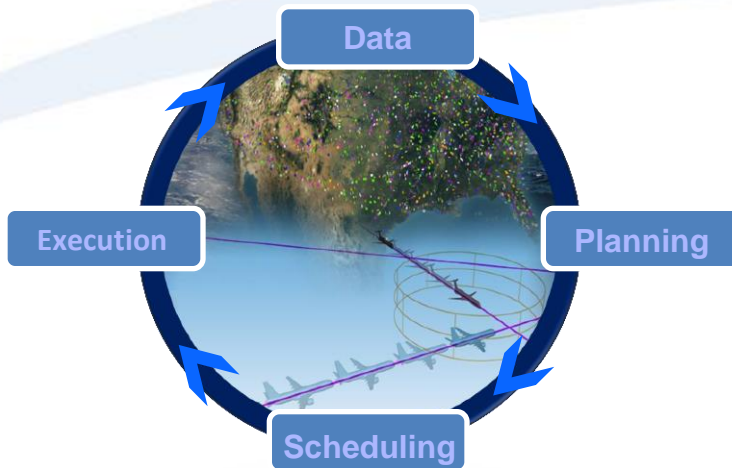
## TBO Objectives:

- Improved flight efficiency
- Efficient use of capacity
- Improved schedule predictability
- Increased operational flexibility
- Increased ability to exchange trajectories with the users



# Path to Trajectory Based Operations

*Managing aircraft based on where they will be at "critical points in time"*



## 2020

### Arrival TBO

- ADS-B Out mandate
- Performance Based Navigation at nine metroplex sites
- New tower automation
- Initial Data Comm (tower and en route)
- New voice communications
- Improved weather information
- New automated tool to support surface/terminal environment

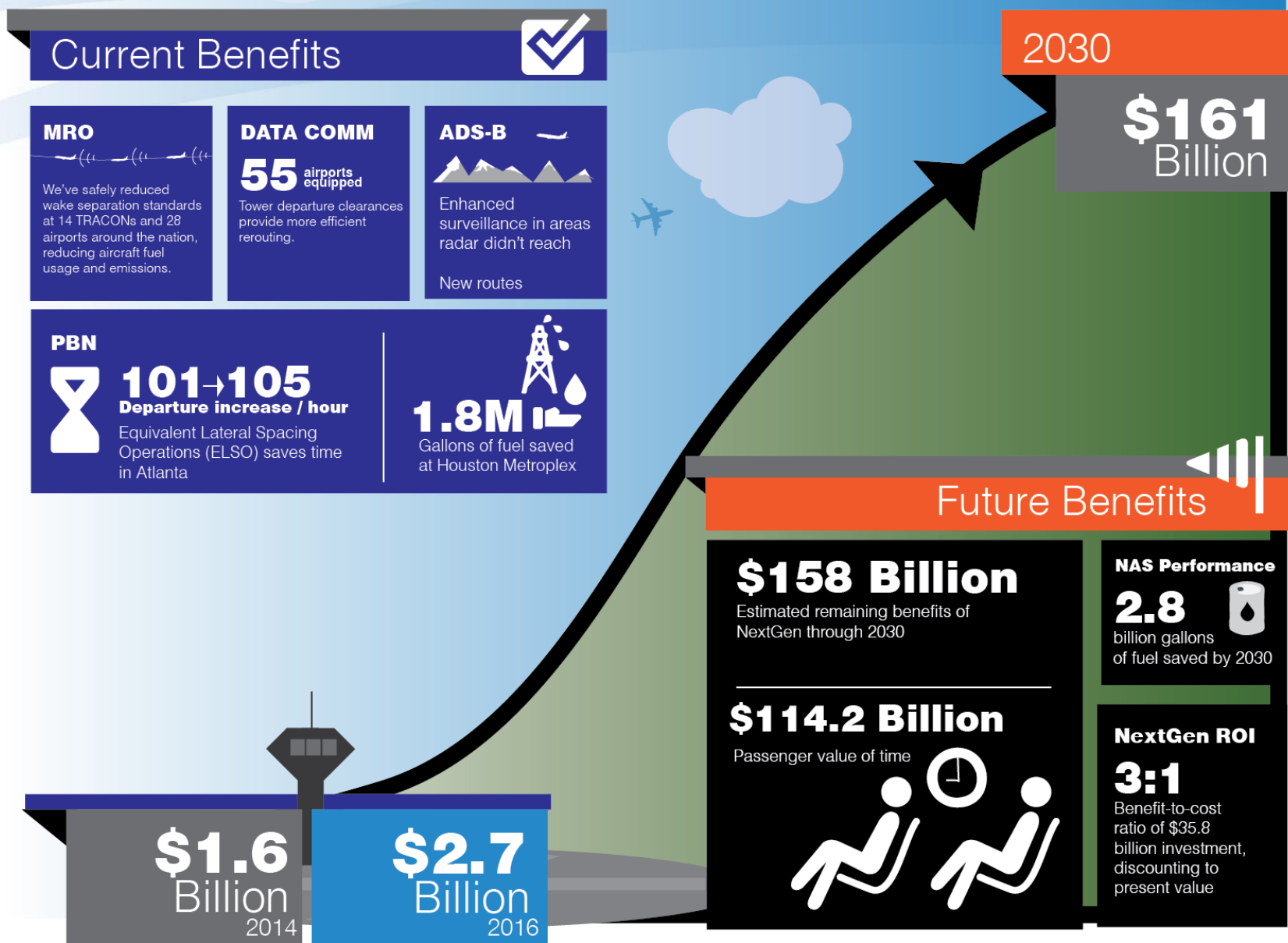
## 2025

### Gate to Gate TBO

- Improved voice communication across the NAS
- ADS-B In
- Data Comm full capability
- Aircraft equipage alignment with new standards
- New automated tools (all phases of flight)

DEPARTURES					
Destination	Time	Gate	Carrier	Flight	Status
ATLANTA	8:00P	12A	DL	1111	On Time
CLARK	8:00P	12B	DL	1112	On Time
MEMPHIS	8:00P	12C	DL	1113	On Time
INDIANAPOLIS	8:00P	12D	DL	1114	On Time
SEATTLE	8:00P	12E	DL	1115	On Time
PHOENIX	8:00P	12F	DL	1116	On Time
LOS ANGELES	8:00P	12G	DL	1117	On Time
SAN FRANCISCO	8:00P	12H	DL	1118	On Time
PORTLAND	8:00P	12I	DL	1119	On Time
SEASIDE	8:00P	12J	DL	1120	On Time
ST. LOUIS	8:00P	12K	DL	1121	On Time
CHICAGO	8:00P	12L	DL	1122	On Time
PHILADELPHIA	8:00P	12M	DL	1123	On Time
NEW YORK	8:00P	12N	DL	1124	On Time
WASHINGTON	8:00P	12O	DL	1125	On Time
BALTIMORE	8:00P	12P	DL	1126	On Time
ATLANTA	8:00P	12Q	DL	1127	On Time
CLARK	8:00P	12R	DL	1128	On Time
MEMPHIS	8:00P	12S	DL	1129	On Time
INDIANAPOLIS	8:00P	12T	DL	1130	On Time
SEATTLE	8:00P	12U	DL	1131	On Time
PHOENIX	8:00P	12V	DL	1132	On Time
LOS ANGELES	8:00P	12W	DL	1133	On Time
SAN FRANCISCO	8:00P	12X	DL	1134	On Time
PORTLAND	8:00P	12Y	DL	1135	On Time
SEASIDE	8:00P	12Z	DL	1136	On Time
ST. LOUIS	8:00P	13A	DL	1137	On Time
CHICAGO	8:00P	13B	DL	1138	On Time
PHILADELPHIA	8:00P	13C	DL	1139	On Time
NEW YORK	8:00P	13D	DL	1140	On Time
WASHINGTON	8:00P	13E	DL	1141	On Time
BALTIMORE	8:00P	13F	DL	1142	On Time
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PHOENIX	8:00P	13L	DL	1148	On Time
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PORTLAND	8:00P	13O	DL	1151	On Time
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WASHINGTON	8:00P	13U	DL	1157	On Time
BALTIMORE	8:00P	13V	DL	1158	On Time
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MEMPHIS	8:00P	13Y	DL	1161	On Time
INDIANAPOLIS	8:00P	13Z	DL	1162	On Time
SEATTLE	8:00P	14A	DL	1163	On Time
PHOENIX	8:00P	14B	DL	1164	On Time
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SAN FRANCISCO	8:00P	14D	DL	1166	On Time
PORTLAND	8:00P	14E	DL	1167	On Time
SEASIDE	8:00P	14F	DL	1168	On Time
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CHICAGO	8:00P	14H	DL	1170	On Time
PHILADELPHIA	8:00P	14I	DL	1171	On Time
NEW YORK	8:00P	14J	DL	1172	On Time
WASHINGTON	8:00P	14K	DL	1173	On Time
BALTIMORE	8:00P	14L	DL	1174	On Time
ATLANTA	8:00P	14M	DL	1175	On Time
CLARK	8:00P	14N	DL	1176	On Time
MEMPHIS	8:00P	14O	DL	1177	On Time
INDIANAPOLIS	8:00P	14P	DL	1178	On Time
SEATTLE	8:00P	14Q	DL	1179	On Time
PHOENIX	8:00P	14R	DL	1180	On Time
LOS ANGELES	8:00P	14S	DL	1181	On Time
SAN FRANCISCO	8:00P	14T	DL	1182	On Time
PORTLAND	8:00P	14U	DL	1183	On Time
SEASIDE	8:00P	14V	DL	1184	On Time
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CHICAGO	8:00P	14X	DL	1186	On Time
PHILADELPHIA	8:00P	14Y	DL	1187	On Time
NEW YORK	8:00P	14Z	DL	1188	On Time
WASHINGTON	8:00P	15A	DL	1189	On Time
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INDIANAPOLIS	8:00P	15F	DL	1194	On Time
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PHOENIX	8:00P	15H	DL	1196	On Time
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PHOENIX	8:00P	15X	DL	1212	On Time
LOS ANGELES	8:00P	15Y	DL	1213	On Time
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PORTLAND	8:00P	16A	DL	1215	On Time
SEASIDE	8:00P	16B	DL	1216	On Time
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PHOENIX	8:00P	16N	DL	1228	On Time
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PORTLAND	8:00P	16Q	DL	1231	On Time
SEASIDE	8:00P	16R	DL	1232	On Time
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CHICAGO	8:00P	19F	DL	1298	On Time
PHILADELPHIA	8:00P	19G	DL	1299	On Time
NEW YORK	8:00P	19H	DL	1300	On Time

# NextGen Benefits



# Challenges Ahead

- Training, cultural and human factors change of operational workforce (e.g., controllers, pilots, traffic flow managers)
- Maintain community consensus (e.g., noise)
- Operational integration of all air-ground capabilities to achieve full benefits
- Continue to build stakeholder buy-in (e.g., airline equipage, usage of new capabilities)
- Remain agile to accommodate changing needs (e.g., cybersecurity, new entrants such as unmanned aircraft and commercial space)
- Counter oversight criticisms (e.g., cost, schedule, management)
- Maintain stable, adequate funding
- The DOT/FAA/OMB, government partners and Congress, need to be on the same path ahead

