# NextGen Update

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## Aeronautics and Space Engineering Board

**Presented by**

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# FAA Air Traffic Management Transformations Underway

## Past Practices

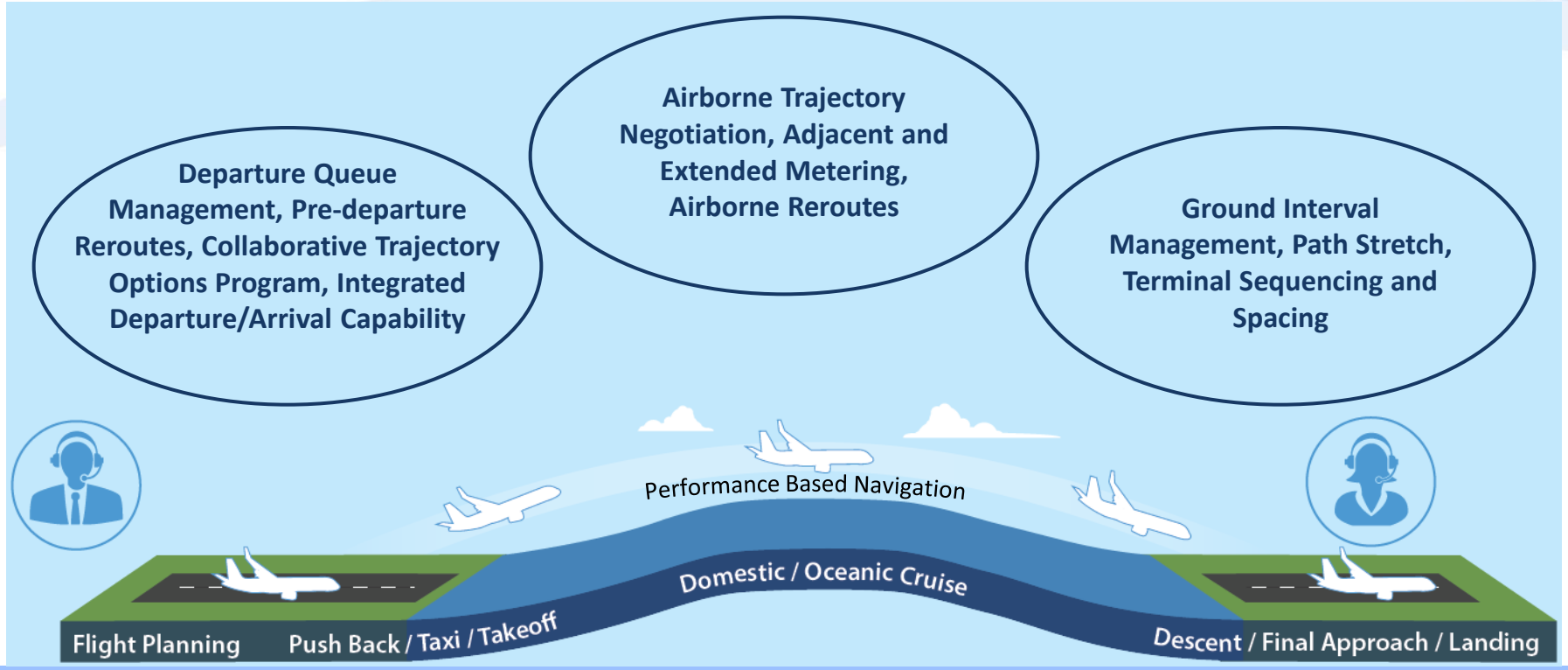
- ***Aircraft Routes:*** Routing limited by ground-based navigational infrastructure
- ***Aircraft Location:*** Future time and position of the aircraft not known by all parties*
- ***Information***: Controllers and operators do not have same information to inform decisions
- ***Communications:*** Controllers 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"*

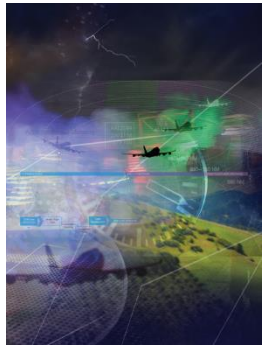
**Trajectory Based Operations** is an air traffic management (ATM) concept to operate the NAS based on the aircraft's ability to fly precise paths in time/space, and air navigation service provider's ability to strategically manage and optimize trajectories throughout the operation.

**Two Key Elements of TBO:**

1. Time-Based Management
2. Performance Based Navigation

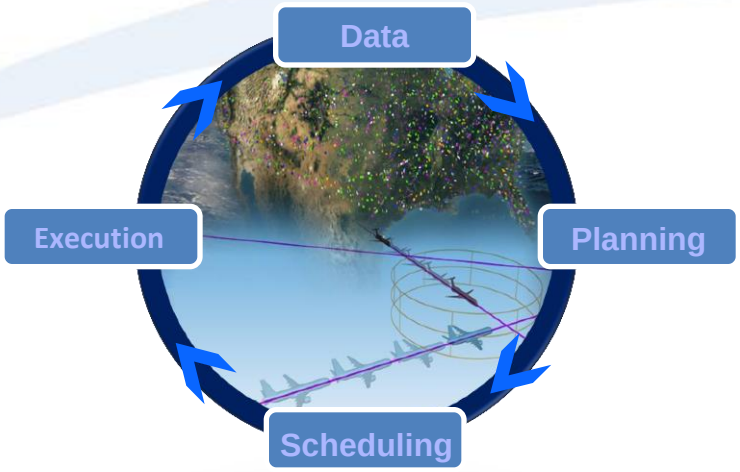
**TBO Objectives:**

- 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

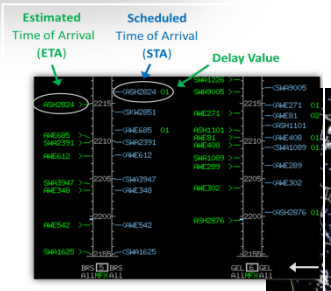
### Arrival TBO

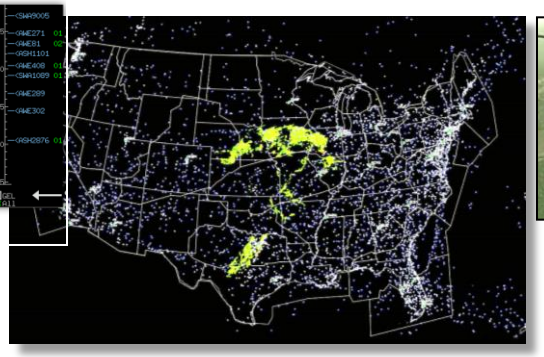
- ADS-B Out mandate
- Performance Based Navigation at nine metroplex sites
- New tower automation
- Initial Data Comm (tower and en route)
- New voice communications
- Improved weather information
- New automated tool to support surface/terminal environment

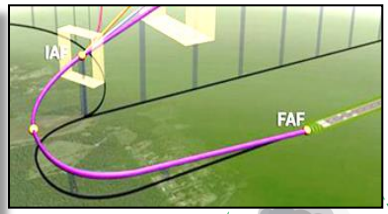
## 2025

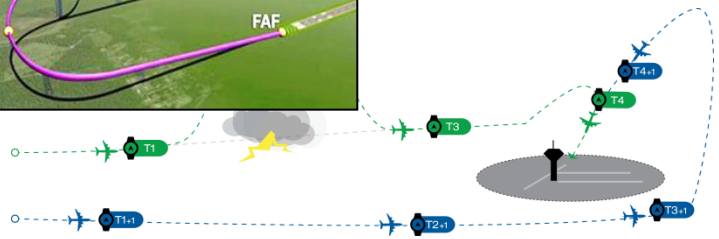
### Gate to Gate TBO

- 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)

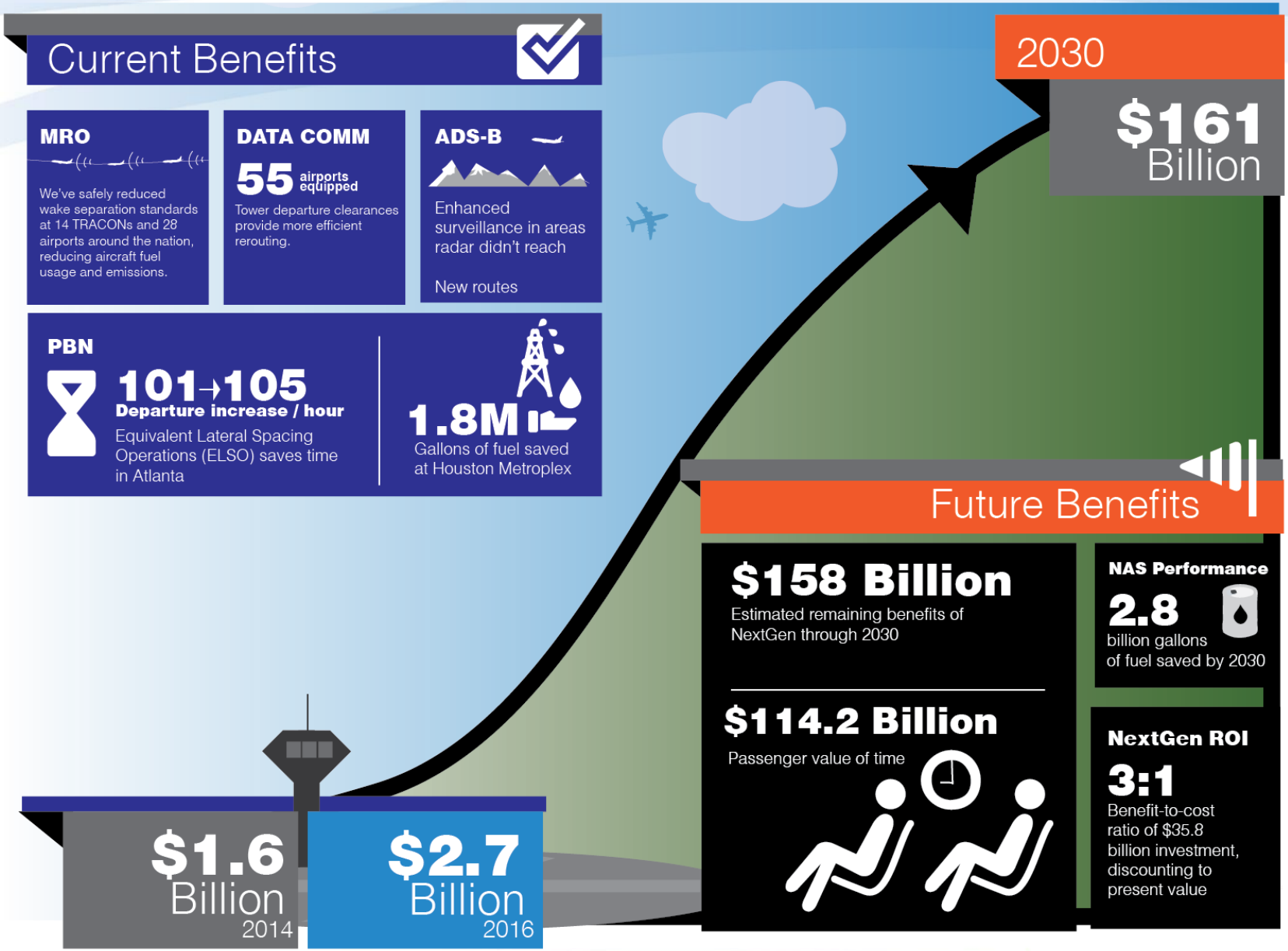






**All elements of the system continuously working together to improve flight efficiency, efficient use of capacity, improve schedule predictability, increase operational flexibility, and increase ability to exchange trajectories with the users.**

# 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