Procedure Design for Logan Airport Community Noise Reduction

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Performance-Based Navigation (PBN)

NEXT GEN Components: RNAV/RNP
Moving to Performance-Based Navigation

Conventional Routes
Today's airways connect ground-based navigation aids

RNAV
Area Navigation (RNAV) routes follow defined "waypoints"

RNP
Required Navigation Performance (RNP) routes within specified "containment area"

Source: Federal Aviation Administration
RNAV Track Concentration

Image Source: Massport

Source: ASDE-X
8 days in 2015
Impact of PBN Concentration

- Population sensitive to changes at levels well below the 65 DB “significant” Day-Night Noise Level (DNL)
- Overflight frequency perceived to increase under tracks
  - Precise overflight tracks make visual identification easier
- Exposure less attributable to “random” processes
  - Track directly related to procedure
- Traditional Metrics not perceived to capture overflight frequency
  - At lower DNL levels the number or frequency of events may be more important than DNL or Lmax
- Concentration raises issues of Equity
  - Popular to propose dispersion as a solution
  - Dispersion results in more noise impact
- Can PBN capability be used to reduce community noise impact
Noise Complaints at BOS: One Dot per Address

Each dot represents an address that registered at least one complaint during period

Departures

Arrivals

Complaint Data: August 2015– July 2016
Track Data: ASDE-X from 12 days of operation, 2015-2016
Noise Complaints at BOS: Dots Weighted by Complaint Frequency

Each dot represents an address that registered at least one complaint during period
Marker size corresponds to number of complaints registered by address

Departures

Arrivals

Each Marker Represents One Address

 Complaint Data: August 2015–July 2016
 Track Data: ASDE-X from 12 days of operation, 2015-2016
Potential Uses of PBN for Reducing Noise

- **Spatial Management**
  - Noise preferred arrival and departure routes
    - Precise Lateral Trajectories
    - Low population density or background shielding
    - Critical point avoidance
  - Flight track dispersion or concentration

- **Vertical Management**
  - Modified Departure Angles
    - Speed or Thrust Scheduling
  - Modified Approach Angles
    - Continuous Descent Arrival (CDA)
    - 2 Segment or Steep Approaches

- **Speed/Drag Management**
  - Low power/low drag approach profiles (DDA)

- **Others?**
Technical Approach

- Collect Data and Evaluate Baseline Conditions
  - Pre and Post RNAV
- Identify current procedures which appear to have community noise benefit
- Determine Technical and Operational Limitations
  - Aircraft Performance
  - Navigation and Flight Management (FMS)
  - Flight Crew Workload
  - Safety
  - Procedure Design
  - Air Traffic Control Workload
- Identify Candidate Procedure Modifications
  - Block 1/Block 2
- Model Noise Impact
  - Standard and Supplemental Metrics
- Evaluate Implementation Barriers
- Recommend Procedural Modifications to Massport and FAA
- Repeat for Block 2
Departures

2015-2016 Noise Complaints at BOS
with 12 Days of Departure Tracks

Each Marker Represents One Address
Arrivals

2015-2016 Noise Complaints at BOS
with 12 Days of Arrival Tracks

Each Marker Represents One Address
Project Schedule
Preliminary/Subject to Change

- FAA/ Massport Discussions  Winter – Fall 2016
- Announcement  Oct 2016
- Consultant Team Organization  Fall 2016
- Historical Flight Comparison\Analysis  Dec to Feb 2016
- Block 1 Procedure Opportunity  Feb 2017
  - lower complexity, benefits with minimal/no negative impacts
  - DNL and Alternative Metrics (single event above threshold)
- Block 1 Recommendations  Apr 2017
- Block 2 Procedure Opportunity  Jun 2017
  - More complexity, benefits and potential negative impacts
  - DNL and Alternative Metrics (single event above threshold)
- Block 2 Recommendations  Fall 2017
- FAA Review Process  Ongoing/TBD
- Implementation/Final Report  TBD