Precision Departure Release Capability (PDRC)

NASA to FAA Research Transition

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6 August 2013
PDRC Highlights

• Potential to assist in tactical departure clearances impacting metered airports
  • Over 30,000 aircraft per month will get improved departure clearances into constrained overhead/enroute flows
  • 22% of arrival aircraft will have significantly improved arrival meter schedules
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  • 22% of arrival aircraft will have significantly improved arrival meter schedules
• A field-validated automation tool leveraged off existing FAA systems (TMA and SDSS)
  • OFF Time compliance improvement from 54% to 83%
  • Nearly a 1-minute improvement in both mean and standard deviation of OFF Time predictability
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  • 22% of arrival aircraft will have significantly improved arrival meter schedules
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  • OFF Time compliance improvement from 54% to 83%
  • Nearly a 1-minute improvement in both mean and standard deviation of OFF Time predictability
• Concept of Operations, Technology Description and Operational Evaluation results all handed over to the FAA
Tactical Departure Scheduling: What is the Problem?
~34,000 or 1/5 were tactically scheduled arrivals
PDRC has the potential to significantly improve and increase tactical departure clearance compliance to metered airports.

~34,000 or 1/5 were tactically

20,000 Non-metered arrivals

>10,000 outbound tactically scheduled
Technology Imbalance

En route trajectory-based decision support tool develops tactical departure schedules using...

Manually-computed OFF time predictions
Today’s Departure Operations

Technology Imbalance

Can be addressed with information from NextGen surface trajectory-based operations tools
PDRC Concept Overview
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Surface system OFF times and runway assignments predictions
Communication of assigned OFF times and more accurate departure scheduling

Surface system OFF times and runway assignments predictions

PDRC Concept Overview

NASA

TRACON

ARTCC

Center DST

Tower DST
Improved Ability to Fit into Overhead Stream
Integrated Arrival/Departure/Surface System
IADS Research Transition Team

- NASA and FAA established the Research Transition Teams to ensure NASA’s NextGen R&D products are identified, quantified, and effectively transferred to the FAA.

- Key PDRC events in coordinating transition of NASA research products
  - Jun 2009    NASA initiated PDRC research activity
  - Sep 2009    PDRC product defined in IADS RTT plan
  - Sep 2010    PDRC TIM @ NASA Ames
  - Mar 2011    PDRC briefing and demo at ASP TIM
  - Nov 2011    PDRC stakeholder update @ FAA HQ
  - Jun 2012    preliminary PDRC tech transfer
  - Jun 2013    final PDRC tech transfer

- Represented by:
  - NASA NextGen SAIE Project
  - FAA NextGen organization (ANG) and Air Traffic Organization (ATO)

- Next meeting August 7th to discuss selected IADS RTT efforts.
Prototype System Overview

Traffic Management Advisor (TMA)
- 1997 NASA → FAA tech transfer
- FAA further developed and deployed throughout the NAS

Surface Decision Support System (SDSS)
- 2004 NASA → FAA tech transfer
- NASA and FAA use for NextGen surface research and TFDM development
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**PDRC enhancements**
- Two-way data exchange between tools
- Enable use of surface information (predicted runway and OFF time) in TMA departure scheduling
- Automate Center/Tower release time coordination
- Departure prediction improvements for both TMA and SDSS

**Surface Decision Support System (SDSS)**
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**NASA/FAA Collaboration**

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**PDRC enhancements**
- Two-way data exchange between tools
- Enable use of surface information (predicted runway and OFF time) in TMA departure scheduling
- Automate Center/Tower release time coordination
- Departure prediction improvements for buses

**Surface Decision Support System (SDSS)**
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**Tactical surface data exchange (TSDE) air carrier interface**

**Created research version of TMA now used by both agencies**

**Collaborate on SDSS development for NextGen surface R&D**
PDRC Operational Evaluations

Objectives
• Validate PDRC concept
• Demonstrate system performance
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Environment and Methodology
• DFW Tower and Fort Worth Center TMU
• Operational flights subject to Call For Release
• Use PDRC for OFF time predictions, scheduling and release time coordination
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Summary
• Two phase evaluation over 29 weeks
  May 2012 – Jul 2012  120 flights
  Nov 2012 – Feb 2013  118 flights
• Block 2 includes new versions of SDSS and TMA plus adaptation upgrades
OFF Time Compliance Improvements

OFF Time Compliance (OTC)
OTC = Actual OFF – Target OFF

Call for Release operations generally seek to meet a -2/+1 minute release window

![Graph showing OFF time compliance (sec) and percentage of flights for early and late releases. The x-axis represents OFF time compliance in seconds, and the y-axis represents the percentage of flights. The graph indicates the distribution of flights that occur early or late compared to the target OFF time.]
OFF Time Compliance Improvements

Comply with -2/+1 window
Baseline = 54%
OFF Time Compliance Improvements

OFF Time Compliance (OTC)
OTC = Actual OFF – Target OFF

Comply with -2/+1 window
Baseline = 54%
Block 1 = 74%
OFF Time Compliance Improvements

OFF Time Compliance (OTC)
OTC = Actual OFF – Target OFF

Comply with -2/+1 window
- Baseline = 54%
- Block 1 = 74%
- Block 2 = 83%

![Graph showing OFF time compliance with percentage of flights and time in seconds.](image)
PDRC Research Products

- Characterize NAS-wide tactical departure operations
- Analyze uncertainty in tactical departure operations
- Preliminary Concept and Technology Description
- Concept of Operations
- Technology Description
- Operational evaluation results
NASA/FAA Research Partnerships

• FAA NextGen organization (ANG)
  – Facilitated tech transfer via Research Transition Team
  – Joint development of Surface Decision Support System
  – Supported enhancements to TMA
  – Collaborated on two-way air carrier interface

• FAA Air Traffic Organization (ATO)
  – Provided input on PDRC development and evaluation plans
  – Active, ongoing dialogue to ensure successful research transition
  – DFW TRACON (D10) and Fort Worth Center (ZFW) test/eval

Key to success was jointly defining what the “baton” needed to be and where the exchange was to occur.
Next Steps

• PDRC is complete

• New work will be planned within the IADS RTT

• Future tactical departure scheduling research builds on the PDRC foundation