Precision Departure Release Capability (PDRC)

NASA to FAA Research Transition

Shawn Engelland and Tom Davis
On behalf of NASA’s Airspace Systems Program

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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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  • 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
• 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
• 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
Today’s Departure Operations

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

ARTCC

Center DST

Tower DST

TRACON

ARTCC
PDRC Concept Overview

Communication of assigned OFF times and more accurate departure scheduling

Surface system OFF times and runway assignments predictions
Improved Ability to Fit into Overhead Stream
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 better planning

**Surface Decision Support System (SDSS)**
- 2004 NASA → FAA tech transfer
- NASA and FAA use for NextGen surface research and TFDM development

Created research version of TMA now used by both agencies

Collaborate on SDSS development for NextGen surface R&D

Tactical surface data exchange (TSDE) air carrier interface
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

Early ↔ Late

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

Percentage of flights

OFF time compliance (sec)
OFF Time Compliance Improvements

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

Percentage of flights

OFF time compliance (sec)
OFF Time Compliance Improvements

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

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

Percentage of flights

OFF time compliance (sec)
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%

Diagram showing percentage of flights versus OFF time compliance (sec) with early and late markers.
PDRC Research Products
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