

NextGen Implementation: One Operator's View



Demonstration of Concepts in Revenue Service

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Agenda

- History
- October 2004 – Present: NextGen Demonstration
- Timeline
- Our Experience

History

- UPS involvement in implementing NextGen technologies dates back to 1996
- We accomplished 2 certifications that resulted in 107 B757/767 equipped with ADS-B in/out and CDTI
 - enhanced see and avoid was the only approved application
 - VMC weather conditions only
- Certification, Operations Approval and Implementation of that modest and benign application gave us a good idea of the challenges we would face with higher level applications

History

- 2002-05: Congress funds Louisville Technology Initiative based on our ADS-B equipage
- Brought together a suite of advanced technologies to...
 - Demonstrate future operating concepts in medium density terminal operations
 - Demonstrate safety and operational improvements
 - Demonstrate future concepts in the changing roles of pilots and controllers
 - Develop a model for modernizing other medium- to-high density airports

History

- Technology infrastructure implemented under Safe Flight 21
 - ASDE-X and ADS-B surveillance
 - Common ARTs IIIe color displays
 - Surface Management System
 - Certified Data Distribution Module for sharing surveillance data between FAA and operator
 - Airport vehicles equipped with ADS-B out

History

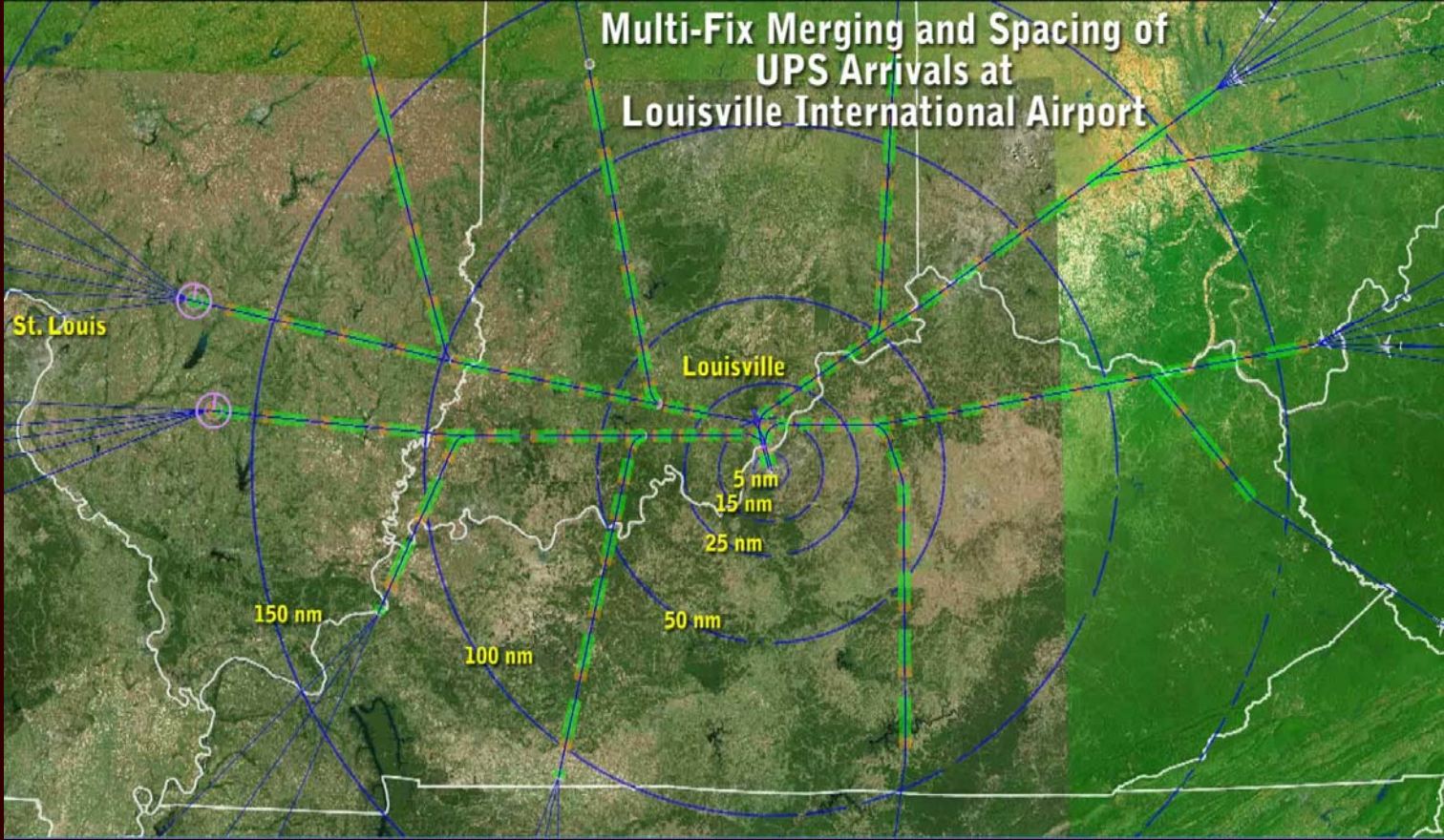
- October 2004: FAA Center of Excellence for Noise and Emissions and UPS team demonstrate Continuous Descent Arrivals
 - Near idle power descent from enroute airspace to final approach
 - Controllers monitor for conformance, no vectors or altitude changes
 - RNAV procedures for navigation
 - FMS optimized descent profiles
 - Arrival procedure terminated at the ILS
- 125 successful procedures out of 126
- Well documented reductions in fuel burn, noise and emissions
- Further confirmation that NextGen implementations could be difficult without proper foundational work

October 2004 – Present: NextGen Demonstration

Goals

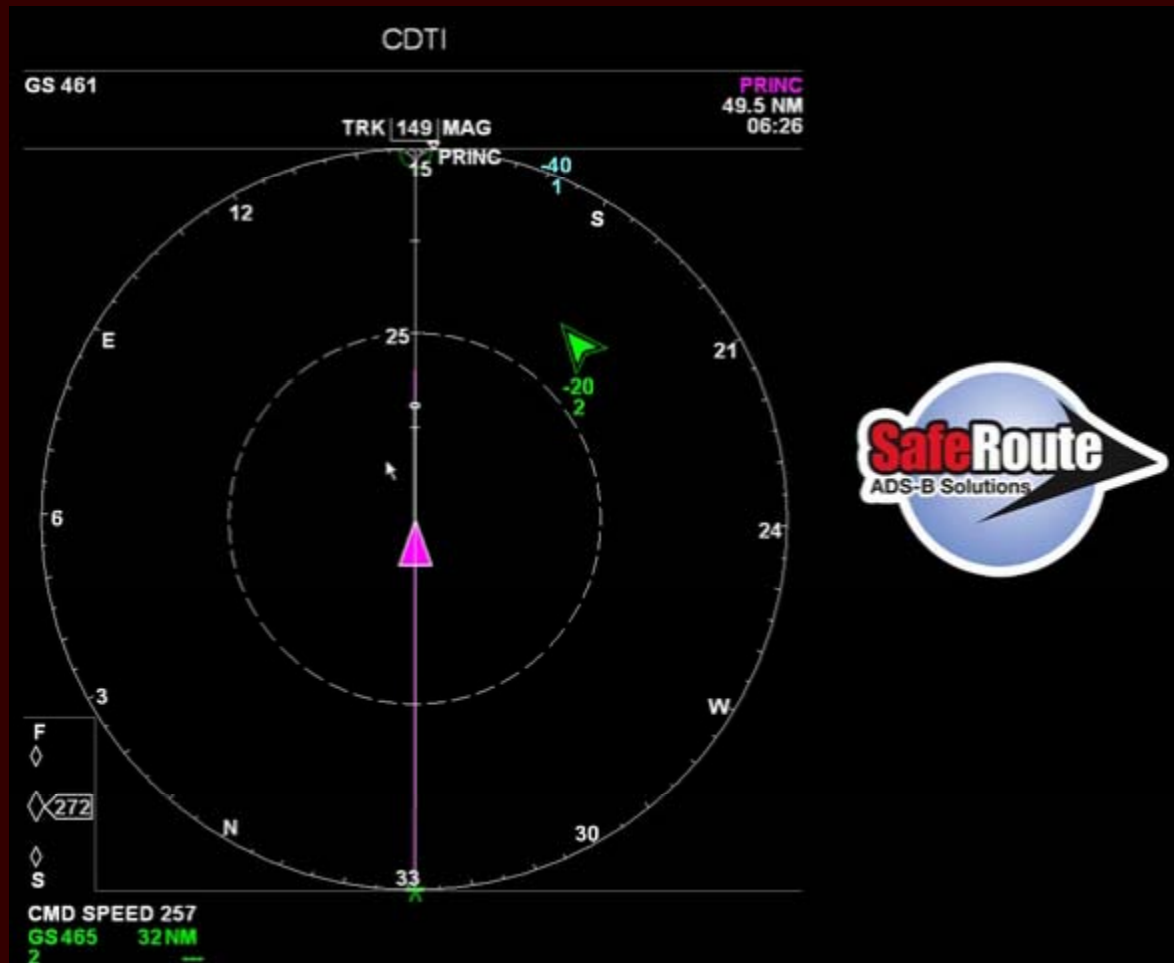
- Realize the full potential of our airport and aircraft performance reliability and predictably into the future utilizing NextGen concepts
- Leverage technology and concepts that were mature enough for “immediate” implementation
 - near term operational benefits
 - strategically correct relative to NextGen
 - reasonable certainty that this work would not be “throw-away”
 - provide foundational experience for others to follow

Multi-Fix Merging and Spacing of UPS Arrivals at Louisville International Airport



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- NextGen CDA
 - Delegates the task of in-trail spacing management to the cockpit
 - Supported by ADS-B spacing application
 - Time-based interval accounts for variable aircraft performance during descent
 - Allows optimal runway utilization while ensuring safe in-trail spacing
 - Ground-based tools provide organization and set-up
- Benign – from some perspectives
- Highly complex and challenging from other perspectives



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Team Approach

- UPS teams up to implement required avionics and ADS-B applications to support NextGen CDAs – and more
 - FAA
 - Certification Tiger Team, ABESS, RNAV arrival procedures
 - ACSS's SafeRoute
 - Merging and spacing ADS-B application
 - Surface Area Movement Management – SAMM
 - CDTI Assisted Visual Separation – CAVS
 - Boeing/Astronautics Class 3 EFB
 - Provide display and pilot interface for ADS-B applications
 - Traditional EFB applications for charts and manuals
 - Future applications – CPDLC, ELogbook, satellite wx

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Team Approach

- UPS teams up to implement required avionics and ADS-B applications to support NextGen CDAs – and more
 - Jeppesen
 - Airport surface maps to support SAMM
 - Terminal procedures charts
 - Gables ADS-B Guidance Display – AGD
 - Mission critical information in Forward Field of View
 - Speed to fly, distance in-trail

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Timeline

- June 2005 ACSS announces launch of SafeRoute development
- June 2007 SafeRoute certified for B-757
- December 2007 UPS Ops Approval for SafeRoute/ EFB on B-757
- July 2008 SafeRoute certified on the B-767
- December 2008 UPS Ops Approval for SafeRoute/EFB on B-767
- 6 B-757s equipped and active in 2008
- 5 B-767s now equipped and active
- Further installations halted; project review based on economic business realities

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Results to date

- 45 successful NextGen CDAs using Merging & Spacing operations (lead ship CDA not included in the numbers)
- 2 successful 3-ship strings
- 1 successful 4-ship string
- Collective fuel savings for last 25 min of flight
- Lead ship to trail ship landing separation has varied from 4.8 to 7.3 miles at 150 or 145 second intervals
 - pilot technique
 - headwinds

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Results to Date

- SafeRoute ADS-B applications performing as desired
- Surface Area Movement Management is a robust application
- Good cooperation and acceptance by controllers
 - Not enough frequency of flights to get them completely comfortable
- Fairly benign and intuitive for pilots
 - Very comfortable with SafeRoute applications
 - Location of EFB acceptable but not optimal

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Short term goals

- Continue maturing arrival procedures from the west using 11 equipped aircraft
- Continue data collection and building experience
- Implement new CDA arrival procedures from all quadrants using flexible tubes
 - RNAV navigation
 - Optimal FMS descent profile
 - Altitude windows – “at or above” vs. “at”
 - Public procedures available 24x7
 - Foundation to implement high density NextGen CDA Merging and Spacing operations from all directions
 - Can be used with or without Merging and Spacing

Our Experience

- Transition will not be easy but possible with adequate (government) funding
- Gaining experience in revenue service at medium complexity airports is crucial as it reduces total overall risk but...
 - Requirements have to be locked down
 - Stakeholders *must* work toward a common goal
 - Results have to be repeatable by other operators with different equipment types at other airports
 - ~ *it is a myth that this can only be done at Louisville*

Our Experience

- Regulators, operators and ATO must have a well-defined path for certification all the way to Ops Approval
 - Many opportunities for disconnects between certification units, field units, HQ and operators
 - Principle Inspectors are responsible for granting Ops Approval
 - training, technical resources and support must be robust
 - consideration for the magnitude of these NextGen efforts must be given relative to ATOS and “normal” oversight and certification duties
 - the buck cannot stop at one person – as applications get more complex the level of responsibility (and risk) rises at the same rate
 - need a mechanism for resolving different perspectives that doesn’t place the operator/POI relationship in jeopardy

Our Experience

- ATO must be an integral part of the process
 - Education, encouragement, demonstration, engagement all must take place throughout the ATO at a strategic level so that workforce understands where we are going and how it will affect them
 - Individual projects – like Louisville – must be understood and agreed to at the beginning
 - ATO must be an equal partner in the Ops Approval process with the operator and the local FSDO

Thank you

