The Next Generation Air Transportation System

Overview

Jerry Newsom
October 3, 2005
A Potential Crisis in Our Air Transportation System: Turning Up the Volume

- The metrics are scary: 3x everything
- More O’Hare’s are just waiting to happen
- Security systems are challenged
Flights 1.4-3X
Peers 1.8-2.4X

2004 Baseline
- Current Flight Schedule
- Current Capacities

2014 and later Baseline analysis will use OEP & FACT Capacities

Terminal Area Forecast (TAF) Growth Projection
- TAF Growth Ratios, Lower Rate
- TAF Growth Ratios, Higher Rate

Note: Not to scale

Shift in passengers per flight (e.g., A380, reverse RJ trend, higher load factor)
- Increase of over 10 passengers per flight

Biz shift
- 2% shift to micro jets

Biz shift
- Smaller aircraft, more airports

Flights 1.4-3X
Passengers 1.8-2.4X
Public Law 108-176
December 12, 2003

• Establishes Next Generation Air Transportation System Joint Planning and Development Office

• Series of responsibilities
  – Create and carry out the Plan
  – Coordinate goals, priorities, and research activities within Federal Government and across US aviation industry
  – Facilitate technology transfer from research to operational and private sector organizations
  – Review activities related to environment and safety

• Operate in conjunction with relevant programs in specified government agencies

• Consult with the public and ensure the participation of experts from a broad range of entities within the private sector
Inter-agency Governance

Senior Interagency Policy Committee
- Guides and approves the National Integrated Plan

Joint Planning and Development Office (JPDO)
- Develops and oversees implementation of the National Integrated Plan

Inter-Agency Integrated Product Teams
- Develops and oversees implementation of Action Plans
Integrated National Plan

• Establishes National Goals
• Sets context for Transformation
• Sets direction for Transformation (8 Transformational Strategies)
• Creates governance model for multi-agency cooperation
• Delivered to Congress in December, 2004
A transformed air transportation system that provides services tailored to individual customer needs, allows all communities to participate in the global economy, and seamlessly integrates civil and military operations.
Policy Change/Creation
Organizational Innovation
Culture Acceptance
System-Wide Transformation
Innovation Across All Lines of Development

Policy
Organization
Culture
Technology

Policy
Technology
Organization
Culture
Strategies

- Develop Airport Infrastructure to Meet Future Demand - FAA
- Establish an Effective Security System without Limiting Mobility or Civil Liberties - DHS
- Establish an Agile Air Traffic System - NASA
- Establish User-Specific Situational Awareness - DoD
- Establish a Comprehensive, Proactive Safety Management Approach - FAA
- Develop Environmental Protection that Allows Sustained Aviation Growth - FAA
- Develop a System-wide Capacity to Reduce Weather Impacts - DOC
- Harmonize Equipage and Operations Globally - FAA
2025 NGATS Concept

**Operating Principles**
- “It’s about the users…”
- System-wide transformation
- Prognostic approach to safety assessment
- Globally harmonized
- Environmentally compatible to enable continued growth

**Key Capabilities**
- Net-Enabled Information Access
- Performance-Based Services
- Weather-Assimilated Decision Making
- Layered, Adaptive Security
- Broad-Area Precision Navigation
- Trajectory-Based Aircraft Operations
- “Equivalent Visual” Operations
- “Super Density” Operations
Prognostic Approach to Safety Management

National Culture, Standards & Scope

• National Safety Management Standard

• National Strategic Plan
  ➢ National Goals and Prioritization of Safety Research

• Comprehensive Sharing and Analysis of Relevant Safety Information

• National Safety Culture
  ➢ Continuous Improvement
  ➢ Accountability for establishing a safety culture & making risk-based, data driven decisions
  ➢ “Just Culture”
    – Median between a “Punitive Culture” and a “Blameless Culture”
  ➢ Non-Punitive reporting system
Weather Assimilated into Decisions

Common weather picture across NGATS

- Fuse global weather observations and forecasts into single database, dynamically update as needed
  - Tens of 1000’s of sensors (airborne & ground) feed 100’s of forecast models
- Learning automation accounts for weather and its uncertainties in managing aircraft trajectories
- Identify hazardous weather real-time
- Assimilated into NGATS “decision loops”
  - Total integration via machine-to-machine
  - Critical decision system time scales using both probabilistic and deterministic weather info
  - Optimized to maximize available weather-favorable airspace
  - Terminal weather impacts including ground/ramp ops and adaptability due to wind shift changes
Layered, Adaptive Security

Move people/goods expeditiously from “curb-to-curb” while ensuring protection from foreign & domestic threats

- Adaptive Security for People, Cargo, Airports and Aircraft
- Risk Assessment-Driven Evaluation and Response
- Positive Identification for People and Cargo
- Preventive Threat Detection and Mitigation
Aircraft Trajectory-Based Operations

Adjust airspace configuration to meet user needs

- 4D trajectories (including taxi and rollout) are basis for planning and execution
- Machine-based trajectory analysis and separation assurance
- Includes environmental performance throughout all phases of aircraft ops
- Airspace configuration driven by: DoD/DHS requirements, domestic & international user needs, requirements for special-use airspace, safety, environment, overall efficiency
- Airspace reconfigurable during day of operations
- Users “contract” for airspace access & service
Equivalent Visual Operations

*Increasing capacity from today’s non-visual conditions*

- Aircraft perform "equivalent visual" operations in non-visual conditions (achieve “VFR capacity” under these conditions)

- ATM provider delegates “maintain separation” responsibility to aircraft operators
  - Requires timely, high fidelity information on nearby aircraft, weather, etc

- System-wide availability at all air portals
  - With appropriately capable “landside” (including security)

- Greater predictability of operations at busy airports, including ground operations
Super Density Operations

*Peak performance for the busiest airports*

- **Maximized, environmentally acceptable runway capacity**
  - Reduced arrival/departure spacing
  - Equivalent Visual capability
  - Predictable detection/integration of wake vortex hazards
- **Reduce Runway Occupancy Time**
  - Aircraft energy management during rollout coupled with optimum turnoff selection
  - Situational awareness of “nearby” surface traffic and intent for high-speed turnoff
- **Simultaneous operations on single runway**
  - Multiple aircraft operate on single runway when sufficient “separation” exists
  - High-update rate surveillance info available to all aircraft
- **Incorporates required environmental performance during all operations**
- **Airport “landside” (including security) sized accordingly**
Net-Enabled Information Access

Global secure access, information handled according to “communities of interest”

- “Shared Situation Awareness”
  - Real-time free-flow of info from private, commercial, & government sources, integrated internationally
  - Tailored, responsive and secure
  - Push/pull processes
  - Common awareness of day-to-day ops, events, crises

- Aircraft are integral “nodes” in network

- Integrated cooperative air traffic and non-cooperative national security surveillance
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