ATM-Weather Integration Plan

Segment Four – Integration of Weather and Air Traffic Decisions

Presented to: Friends/Partners in Aviation Weather
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Integration Plan Changes

• Version 1.0 published Sep 17, 2009
• Version 2.0 published¹ Sep 24, 2010, with the following refinements
  – Translation and integration concept (Chapter 2)
  – Analysis of weather integration opportunities (Chapter 3 and Appendix A)
  – Analysis of technologies for quantifying weather constraints and impacts (Chapter 4 and Appendix B), to be covered by Jimmy Krozel

• Illustrative scenario by Mark Huberdeau follows

Note 1: V2.0 at http://tinyurl.com/32gk4v5, 383 pages, 32MB
NextGen Weather Integration Concept and Division of Responsibilities

Primary: NWS

FAA-MET

FAA-ATM

4D Wx

SAS

Performance Feedback

e.g., Turbulence, Icing, Convection

Weather Translation
Translation to Aviation Constraints and Threshold Events

Translated Weather

Impact Estimate

ATM Impact Conversion
Conversion to Operational NAS Impact and State Changes

ATM Decision Support
Impact Mitigation Options

e.g., Convective Weather Avoidance Model (CWAM)
Weather Avoidance Fields (WAF)

e.g., Capacity of Flow Constrained Area

e.g., Collaborative Trajectory Options Program

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Rules of engagement

• **Weather community responsible for:**
  – state of the atmosphere
  – translation to generalized aviation constraints

• **ATM community is responsible for:**
  – determining operational impacts on operations
  – decision support systems

• **Weather constraints to be calculated in response to ATM needs**
Weather Integration Opportunities (Chapter 3, Appendix A)

Solution Set-Oriented Analysis

- **Single unified format used for each solution set analysis**
  - Compressed version of the format used in V1.0 for the TBO and Hi Density analyses
  - Fewer pages/analysis 😊

- **Addition of Safety, Security and Environment (SSE) and Facilities (FAC) solution set analyses**
  - Additional pages 😞

Program-Oriented Analysis (New)

- **NextGen weather-related capabilities associated with FAA programs**
- **Analyses of the programs conducted and program/weather integration gaps identified**
- **Graphical representations, based on NAS EA timelines and views, of the programs and related weather activities created**
NAS EA Chart with Weather Insertion Points

Program
- Time Based Flow Management (TBFM)

Solution Set
- Increase Arrivals/Departures at High Density Airports (HD)
- Initiate Trajectory Based Operations (TBO)

OIs
- Increase Capacity and Efficiency Using RNAV and RNP 108209 (TBO)
- Point-in-Space Metering 104120 (TBO)
- Initial Conflict Resolution Advisories 102114 (TBO)
- Time Based Metering Using RNAV and RNP Route Assignments 104123 (HD)
- Integrated Arrival/Departure Airspace Mgmt 104122 (HD)

Improved management of arrivals/surface/Departure Flow Operations 104117 (HD)

Segment A
- TMA
- CIWS integrated into TFMS via TSDs, FTFW on PGUI

Segment B
- TBFM Development
- TBFM Deployment
- CIWS/CoSpa
- CoSpa
- "Stoplight" on TGUI
- "Blocked intervals" impact display on load graphs

Level 1
- RUC
- RR

Level 2
- HRRR
- HRRRE

Level 3
- 0-8 h forecast WAF overlay on PGUI

Convection
- En route
- Terminal

Wind Info
- En route
- Terminal

Technology

Weather

ATM Wx Integration

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Questions?
Step 1: Translate weather into constraints

- Knowing the constraint from the convective weather is about predicting pilot decisions.
- Will they penetrate the weather, or will they divert around it.
- MIT LL has studied past pilot behavior and has drawn a correlation between storm intensity and storm tops.
- Applying the correlation to the weather of the day produces the Weather Avoidance Field (WAF), which is the probability of pilots deviating around a storm.
Step 2: From constraints get capacity

- Apply weather avoidance field (WAF) constraint prediction to corridors across an FCA
- Obtain the total capacity across the FCA