

Determining FAA Mid-Term Aviation Weather Requirements for Traffic Flow Management – *the Transition to NextGen*

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FAA Mid-Term Operational Capability (MOC) 2015-2018 NAS-Level Requirements

- **Core Team: NWPRT led by Cheryl Souders; includes Stewart Stepney, Frances Bayne, Bob Showalter, Jack May, James Tauss, Lorraine Leonard & Ernie Dash**
- **Facilitates Transition from IOC to the Far-Term (FOC) of NextGen in accordance with NextGen CONOPS & NextGen Wx CONOPS**
- **Describes NAS-Level MOC Functional & Performance Requirements not allocated to particular Agencies or solutions**
- **Outlines Requirements in 4-D Wx Data Cube**
 - 4-D Wx Single Authoritative Source (4-D Wx SAS) minimally implemented by MOC with 25% of Required Wx Elements (to include Convections, Winds & Temps)
- **4-D Wx Data Cube contains meteorological data sets (Obs & Forecasts) from which Wx processors (NWS & NWP WP1) create information, but**
 - Wx Integration into Automation systems possibly limited during MOC (2015-2018)
 - Service Gaps may remain in MOC (subject to future benefit/cost prioritization)



Why the Mid-Term ?

Traffic Flow Mgmt (TFM) requires Improved Mid-Term Wx Support for four TFM goals:

- **Flight Planning & Collaboration**
- **Integrated Capacity Management & Flow Contingency Planning**
- **Integrated Arrival/Departure Management**
- **Performance Management**



Mid-Term Wx Actions Needed

- **Improve Wx Forecast Accuracy & Resolution (time & space) enabling TFM to make better decisions for**
 - Routing/Re-routing
 - Aircraft Arrival Rate
 - Airspace Flow Program initiation
 - Ground Stop/Delay
 - SWAP Implementation
 - Metering/Spacing
- **Better Assessment of Airspace Constraints from Wx**
 - NWPRT working with TFM Requirement Working Group (TRWG) to facilitate:
 - Determining Wx Elements TFM Needs & Associated Performance Requirements
 - Translation of Wx State Data to Constraint Fields & Threshold Events
 - Integration of constraint/threshold fields into TFM Automation (DSTs) enabling them to route/re-route around Impact Fields



FAA MOC Wx Requirements' Assumptions

- **MOC Weather Performance values will be less than those of FOC**
 - Accuracy and Resolution will Support TFM Decision Making but not fully meet NextGen needs (more 'coarse' than at FOC)
- **Improved update frequency of Wx information during Mid-Term supports TFM & User need to respond to rapidly changing circumstances**
- **Wx information will be formatted for Integration into automation (DSTs) in the Mid-Term**
 - However, it is not known if TFM & User DSTs will be sufficiently widespread to enable full collaboration
 - The Translation of potential NAS constraints (from Weather) into the Impact on Operations is performed by TFM and User DST, not Weather
- **The availability of consistent, reliable, probabilistic forecasts, covering 3-D location, timing, intensity (and probability of all possible outcomes) is not likely in the Mid-Term**



Approach for TFM Wx Requirements

TRWG & NWPRT identified TFM Wx Needs to include Observations & Forecasts of:

- Convection*#
- Ceiling/Visibility*
 - Marginal VFR*
 - IFR/VFR*
- Icing*#
 - In-Flight Icing
 - Surface
- Turbulence#
- Winds Surface & Aloft
- Volcanic Ash*#
- Microbursts/Low-level Wind Shear*
- Compression due to Winds*
- Liquid/Frozen Precipitation*#

Notes: * = Core 30 airports, # = en route; in most instances TFM wants Event Onset & Cessation



Approach for TFM Wx Requirements

- **NWPRT Methodology**

- Reviewed Mid-Term ConOps
- Developed Mid-Term Functional Requirements
- Used TFM-adjusted Functional Requirements to Develop TFM Mid-Term Performance Requirements
 - Developed Mid-Term Performance Value Tables by determining if current performance requirements are sufficient, or if “in between” performance values (between now and FOC) are needed
- Provided TFM with examples of how to read/interpret the N-Tables so they could validate performance values
- Developed performance requirements using validated performance values from MOC N-Tables



NAS-Level MOC Spatial Accuracy Requirements for Wx Hazards Observations caused by Convection

MOC values; FOC values

Resolution		High Density Terminal	Designated Terminals	Global Terminal s	En Route	Global
Horizontal		1/4 km 2.5 km	0.5 km 2.5 km	5 km 5 km	0.5 km 5 km	5 km 12 km
Vertical	≤ 5000' AGL < 3000'	50 feet 250 feet	50 feet 250 feet	50 feet 250 feet	250 feet 500 feet	250 feet 500 feet
	> 5000' AGL ≥ 3000'	250 feet 500 feet	250 feet 500 feet	250 feet 500 feet	250 feet 500 feet	250 feet 500 feet



FAA TFM MOC Wx Requirements Status Update

TRWG & NWPRT

- NWPRT
 - Provided TRWG with set of Functional & Performance Requirements for Operational Wx elements
 - Briefed TRWG on Functional/Performance Requirements, fielded questions and provided explanation of accuracy values and/or rationale
- TRWG
 - Presently working Near-Term Reqmts w/NWS
 - NWPRT to assist TRWG in transition from Near-Term to MOC
 - Late August 2011 TRWG group meets with expanded TFM users to finalize review and formulate adjudication responses
 - TFM Specialists to review MOC Performance Requirements to validate as TFM Wx Needs
- Based on TRWG review, TFM Wx requirements will be updated or removed if not needed



FAA TFM Wx Requirements for MOC - Summary

Pending Validation by TFM Requirements Working Group:

- Envisioned Wx Performance Requirements values for TFM between those of today and FOC
- Wx Community can provide Translation of State of Atmosphere into at least Convective constraints by MOC
- ANSP & User Automation (DST) likely in place to Assess Impact from Translated Weather
- Post-validation efforts entail:
 - Performing Gap Analysis
 - Addressing how to mitigate gaps via Alternatives Analysis employing system engineering process, Cost Benefit Analysis & Risk Mitigation to examine Wx Architecture before allocating TFM MOC Requirements to various 'systems'
 - Unmet Requirements assigned to Weather R&D

