Delivering NextGen
Next Generation Air Transportation System

Weather Systems Implementation

NextGen Network Enabled Weather (NNEW)
NextGen Weather Processor (NWP)

Presented to: FPAW

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Background

- Weather is responsible for 70% of delays over 15 minutes and contributes to 24% of accidents
  - Up to 2/3 of weather delays are potentially avoidable, based on NAS Operations Subcommittee REDAC study
- Traffic managers and users must mentally interpret weather conditions, future traffic, and airspace information and their potential impact on decisions
- Inconsistencies exist in the presentation of weather data among the various weather systems
- A single source of weather information often feeds several different systems the same information through different communication feeds. This point-to-point approach requires high telecommunication costs.
  - The present network would not be able to accommodate the increase in bandwidth requirements without new construction.
- Weather information is presently provided in many different and specialized formats which limits its reuse by multiple systems.
- Automation tools will require more dynamically filtered weather information to support Trajectory Based Operations and airborne weather information.
Current Weather Topology
**Notional To-Be-Weather Architecture**

- **LLWAS-RS**
  - Wind shear/Microburst
  - 6-Level Reflectivity
- **LLWAS-NE**
  - Wind shear/Microburst
  - 6-Level Reflectivity
- **NEXRAD**
  - Reflectivity Products
  - Base Data
  - Surface Observations
- **ASOS/AWOS**
- **Lightning Vendor**
- **NOAA Product Generation Centers**
- **NOAA 4-D Wx Data Cube**
  - METARS, TAFs, SIGMETs Models & AWC Data
  - RUC, Icing, Turb, Conv., Satellite, Alphanumeric products
- **Global Sources**
- **CanRad**
- **JAWS**
- **LIDAR**
- **ASR - WSP ASR-9 WX**
  - Wind shear alerts
- **TDWR**
  - Wind shear alerts
- **NEXRAD**
  - Wind shear alerts
- **ADAS**
  - METARs
- **WMSCR**
- **FBWTG (WARP)**
  - Models & AWC Data
- **WINS (WARP)**
  - Model data & other Wx Data
- **NNEW**
  - Wx Data
  - Wind Shear alerts
- **NWP**
  - WARP
  - CWIS Prototype
  - Convective Products & Forecasts
- **Customer**
  - Las Vegas Airport
  - Alaska Users
- **Pilot**
  - External Service
  - Terminal
  - Local Displays
  - TWIP
- **External Users**
  - Local Displays
- **ARTCC**
  - Local Display, DOTS
  - ERAM
  - HR
  - DSR
  - URET
  - ATOP
  - DOTS + FDP2K @ ZAN
- **Flight Services**
  - FS 21
  - FIS / SBS
  - TFM
- **Traffic Flow Manager**
- **Mobile Users**
- **Wireless**
- **ITWS**
- **FIS / SBS**
- **Pilot**
- **En Route Controllers**
- **En Route Supervisors**
- **Traffic Flow Specialists**
- **Meteorologists**
- **Oceanic ATC**
- **NAS Operations Managers & Specialists**

*This chart is notional and does not include all sources or products*
Keys to Achieving NextGen

- Current capability must be sustained while implementing operational improvements
  - Transition/consolidate legacy weather processing capability
- Provide standardized weather data access for integration into decision-support systems
- Weather must be approached from a portfolio standpoint
  - Avoid exploding weather budget
  - Leverage interagency capability
- NextGen Weather for Segment 1 IOC will consist of portfolio elements from both NNEW and RWI forecast
Weather Data Integration

The ‘Cube’

NOAA Weather Data Providers

Performance Feedback

FAA Weather Data Providers NWP

Weather Translation
Translation to Aviation Constraints and Threshold Events

ATM Impact Conversion
Conversion to Operational NAS Impact and State Changes

ATM Decision Support
Impact Mitigation Options

Weather Information

Translated Weather

Impact Estimate

NNEW

SAS
NWP Program Overview

• **NextGen Weather Processor (NWP)** establishes a common weather processing platform that will functionally replace the legacy FAA weather processor systems and host new capabilities:
  – NWP will consolidate weather product generation by weather processor systems such as:
    • Weather and Radar Processor (WARP)
    • Corridor Integrated Weather System (CIWS)
    • Integrated Terminal Weather System (ITWS)
  – NWP will provide advanced aviation specific weather information through the **assimilation** of extended National Weather Service (NWS) forecast models with real time radar extrapolation
  – NWP will perform **Weather Translation** which will enable the use of weather information by automated decision support tools (DSTs)
  – NWP will address consolidation solutions for weather displays
Weather Processor Segment 1 Roadmap

Processors Planned Decision Points – 1/2011

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FPAW October 2011
NNEW Program Overview

- **NNEW** is an IT infrastructure program that will facilitate integration of weather information into ATM decisions using data from NOAA’s 4-Dimensional (4-D) Weather (Wx) Data Cube and internal and external FAA sources.

- **NNEW Key Elements:**
  - Open Standards Utilization/Development
    - Software that provides capabilities for:
      - Locating data
      - Retrieving data
      - Subsetting of data
    - Data Format Standards
      - GML, XML, and NetCDF-4
      - Working with EUROCONTROL to develop a common data model
  - Metadata Standards
NNEW Key Elements (cont.)

- **Software Development**
  - Registry/Repository
    - ebXML-compliant registry/repository obtained from a commercial source
  - Reference Implementations of OGC data access standards
    - Software that implements the Web Coverage Service (WCS) and Web Feature Service (WFS) standards
    - Provides the mechanism to connect consumers with providers and return the data that are requested
  - Ontology
    - Enables searching for datasets registered in the Registry/Repository in a vocabulary-independent manner
  - Service adaptors
    - Enables legacy systems to provide data to, or use data from NNEW without rewriting the legacy system software
NNEW Goals

• NNEW will:
  – Aid in reducing weather impact in the NAS by facilitating the integration of weather information into ATM decisions
  – Define, develop, and provide capabilities for universal access to weather information from multiple government and industry sources in a SWIM-compatible network
  – Provide the capability to automatically locate and retrieve data for DSTs using global and open standards
  – Provide the capability to retrieve weather information along flight trajectory-specific airspace volumes
  – Provide cost savings in the reduction of future interface development costs and a reduction in the usage of bandwidth in communicating weather data
Notional Architecture

NWS 4-D WX Cube / NWP / Other FAA Internal & External

FAA Users

External Users (airlines, airport operators, etc.)
NNEW-NWP Acquisition Time Lines

- **Investment Analysis Readiness Decision (IARD)** – December 2010
- **Initial Investment Decision (IID)** – Planned for March 2012
- **Final Investment Decision (FID)** – Planned for December 2012
NNEW-NWP Acquisition Activities

- A Market Analysis is being performed this year with Industry and it is comprised of a Market Survey and a Request for Information (RFI)
  - Market Survey (Qualification Information)
    - It was released in May and responses were received in June
    - Purpose was to announce solicitation and determine vendor capabilities
  - Request for Information (RFI) – Screening Information
    - Released in August -September
    - Purpose is to identify the appropriate acquisition strategy to use and satisfy the proposed technical solution/scheduling information objectives
- A Draft Screening Information Request is going to be released to industry in the form of a Request for Comment (RFC)
- A SIR will be conducted in the form of a Request for Offer (RFO) in 2012
Summary

• NNEW Program will:
  – Be an IT infrastructure program that will facilitate integration of weather information into ATM decisions
  – Release its RFP in 2012
  – Receive a Final Investment Decision in December 2012
  – Award contract in 2013
  – Implement the system from 2013 through 2015

• NWP Program will:
  – Consolidate weather product generation by weather processor systems and provide advanced aviation specific weather information
  – Release its RFP in 2012
  – Receive a Final Investment Decision in December 2012
  – Award contract in 2013
  – Implement the system from 2013 through 2015
Backup Slides
Current Weather Displays at Air Traffic Facilities

**ATCT**
- Supervisor
- ITWS SD
- WARP via IDS-4
- 93 Weather Displays at 75 Towers!*

**TRACON**
- TMU
- ITWS SD
- CIWS SD
- WARP via IDS-4
- AT Supervisor
- ITWS SD
- WARP via IDS-4
- 134 Weather Displays at 49 TRACONs!*

**ATCSCC**
- System Operations
- ITWS SD
- CIWS SD
- WARP
- Weather Unit
- ITWS SD
- CIWS SD
- WARP
- 32 Weather Displays at the Command Center!*

**ARTCC**
- TMU
- ITWS SD
- CIWS SD
- WARP
- CWSU
- ITWS SD
- CIWS SD
- WARP
- WARP MWS
- AT Supervisor
- CIWS SD
- WARP
- SOC
- WARP
- ATC
- WARP (via DSR, ERAM, URE, ATOP)
- 325 Weather Displays at 21 ARTCCs!*

*Estimate only