Task N
Convective Weather Integration into TMA Demonstration

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TBFM Enhancements

- **Display** convective weather products on Planview Graphical User Interface (PGUI)
  - Corridor Integrated Weather System (CIWS) precipitation product or Vertically Integrated Liquid (VIL)
  - CIWS Echo Tops (ET)
  - ENSCO Weather Avoidance Field (WAF) as derived from CIWS VIL and ET

- **Integrate** convective weather impact into the estimated time of arrival (ETA) and scheduled time of arrival (STA) calculations in the TMA decision support tool
  - Compute and display trajectory-based NAS impact on PGUI
  - Compute and display weather-impacted ETA and STA on Timeline Graphical User Interface (TGUI)

- **Communicate** to sector controller that metering times include weather delay using a simple indicator
Demonstration Functional Flow - With Task N Enhancements

**Pseudo Pilot**
- Voice comm
- Simulated Wx Radar Display
- CIWS VIL

**ATCoach**
- ATCoach SDD
  - Flight data, track reports

**ERAM**
- Flight data, track data
- Metering Times

**HADDS**
- Flight data, track data
- Metering Times

**TMA**
- Trajectories
- Wx Conflicts

**TM Coordinator**
- TGUI
- PGUI

**Weather Conflict Detection Service**
- WAF
- WAF

**ENSCO WAF Service**

**NNEW On Ramping Service (NOS)**
- CIWS: VIL, ET

- data exchanged using NEMS pub/sub

**FAA**

**NextGEN**
PGUI Enhancements

- **F5 NNEW Weather Panel** – Control and display for Precip, ET and WAF for both current and forecast modes.

- **NNEW VIL, ET; ENSCO WAF** – Weather data in gridded format (i.e., NetCDF4)

- **Convective Impact to Trajectory** – Route Analysis (RA) Route function now includes Trajectory segments impacted by convective weather highlighted in red.
TGUI Enhancements

Weather Delay – estimated time in minutes a flight is expected to deviate around weather. It is accounted for in STA and ETA computations.

Estimated Time of Arrival (ETA) - Undelayed estimated clock time for flight that has not yet crossed the Freeze Horizon to reach the meter fix.

Unfrozen Scheduled Time of Arrival (STA) - Clock time at which a flight that has not yet crossed the Freeze Horizon must arrive at the meter fix that meets sequencing/scheduling constraints entered by the TMC.

Frozen Scheduled Time of Arrival (STA) – STA for a flight that has crossed the Freeze Horizon.

Freeze Horizon (FH) - Defined for a stream class of aircraft, the FH is the distance from the meter fix at which the STAs will no longer be subject to automatic updates.

Delay – Center Absorbable Delay – total delay to be absorbed that has been allocated to Center Airspace.

Estimated Time of Arrival (ETA) - ETA for a flight that has crossed the Freeze Horizon.
LM Trajectory-Based, Grid-oriented Weather Integration Framework

**Flight Management System (FMS)**
- Exchanges trajectories with ground system
- Provides Risk Preference in trajectory
- NNEW consumer

**Weather Service**
- Used in Task N (NOS)
  - Grided WAF Data
  - RUC data
  - Weather radar products

**Trajectory Prediction Service**
- Used in Task N
  - RUC Winds & Temps
  - Airspace Definitions
  - Aircraft Performance
  - Flight Plans & Trajectories

**Conflict Resolution Service**
- Integrates with other DSTs
- Evaluates conflict grid for path resolutions considering AC-Wx conflicts and AC-AC conflicts

**Wx Conflict Detection Service**
- Aircraft - WAF Conflicts
- Aircraft-Aircraft Conflicts
- Creates Conflict Grid

**Conflict Detection Service**
- Establishes conflict grid
- Examines trajectories against - Weather Avoidance Field (WAF) and other aircraft trajectories
- Subscribes to AC trajectories
- Subscribes to WAF data
- NNEW consumer

**ATM System**
- Surface
- Terminal
- En Route
- Oceanic
- Traffic Flow Management

**NNEW Service Adapter**
- Subscribes to NNEW
- Ingest external data
- Filter/pre-process data
- Provide local repository
- Deliver data to internal clients
- Report/alarm data availability

**Trajectory Service**
- Ingest Flight Plans
- Publish trajectories
- NNEW consumer
- Trajectory Synch

*Collaborative ATM (CATM) - System Wide Information Management (SWIM) - Common Support Services Phase 1 Weather (CSS-Wx)*
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