Product Description Document
Gate Forecast
August 28, 2019

Part 1 – Mission Connection

1. Product Description:

The Gate Forecast is an online display of a decision algorithm that uses the High-Resolution Rapid Refresh (HRRR) model to determine potential thunderstorm (TS) activity in a particular terminal arrival or departure sector.

The product display overlays the sector boundaries on the current radar loop. The sectors are color-coded with the current gate status using a three tiered approach:

- Green - no significant weather;
- Yellow - some significant weather that might affect some portions of the gate; and
- Red - significant weather that could affect large portions of the gate.

Around each gate are icons with a compass direction or label and the forecasts for the next nine hours. Each hour is color coded to the amount of significant weather forecast. Clicking on the icon brings up a dialog box that shows the Airport identifier, the gate type (arrival "A", departure "D", arrival or departure "U"), the percent coverage of that gate's area thunderstorm probability (denoted as "TS") meeting yellow or red thresholds, the three HRRR runs used in the forecast, and the time of the last update of the gate forecast. Additional detail regarding the algorithm used to determine yellow and red thresholds is in the Technical Description section of this document.

Select NWS forecasters have the capability to log-in and edit the time periods displayed. The Federal Aviation Administration (FAA), pursuant to Title 49 United States Code, Section 44720, established requirements for this weather information and service which is necessary for the safe and efficient conduct of operations in the National Airspace System (NAS).

2. Purpose/Intended Use:

There is a need for forecasts of significant weather in arrival and departure sectors for major airports. These sectors, also called gates, are polygonal regions which roughly follow Air Route Traffic Control Center (ARTCC) low level sectors where arrivals and departures to these airports will be routed. It is important to know whether significant weather, such as thunderstorms, could affect large portions of the sectors so that traffic can be rerouted, if needed, to other sectors.

3. Audience/Users:

The Gate Forecast is intended to be used by the FAA Traffic Managers in coordination with airline industry representatives to coordinate FAA management and strategic planning of the NAS. The aviation public will have access to the Gate Forecast for situational awareness.

4. Presentation Format:

Example display for Memphis.
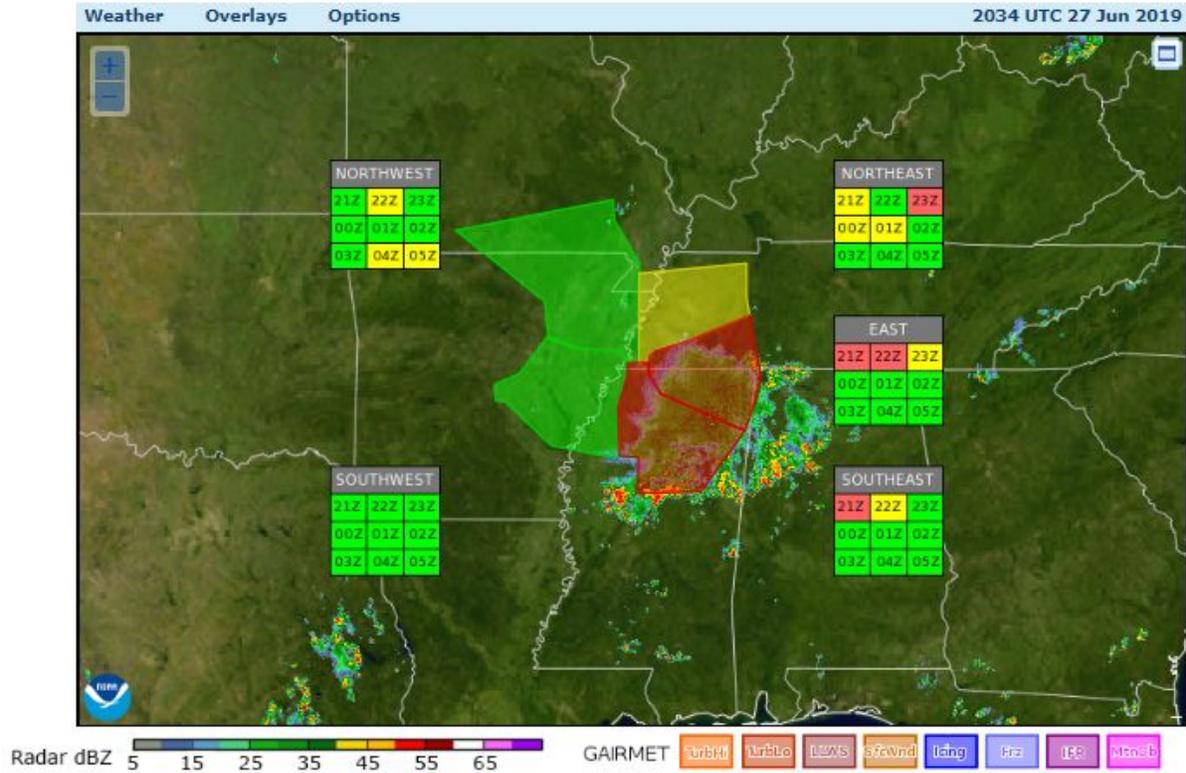
5. Feedback Method:

Please provide feedback to the Aviation Weather Center Warning Coordination Meteorologist.

Jonathan Leffler
Warning Coordination Meteorologist
Aviation Weather Center
Kansas City, MO 64153
816-584-7239
Jonathan.Leffler@noaa.gov

Part 2 – Technical Description

1. Format and Science Basis:

The Gate Forecast is a decision support algorithm that uses the High Resolution Rapid Refresh (HRRR) model to determine whether there is the potential for thunderstorm activity in a particular terminal gate. The algorithm initializes with the HRRR composite reflectivity forecasts and then creates a time lag ensemble using the previous three HRRR model runs. It produces a grid with the maximum composite reflectivity at each grid point from the three runs (for example, the 1 hr forecast from the 18 UTC run plus the 2 hr forecast from the 17 UTC run and the 3 hr forecast from the 16 UTC run). From that grid, a probability factor is computed. Low composite reflectivity equates to low probability. High composite reflectivity equates to high probability. The algorithm computes the gate sector coverage of these probabilities. If more than 1% of the sector is covered in low probability (0.25 chance), the gate is colored yellow. If more than 4% of the sector is covered in high probability (0.60 chance), then it is colored red. These are then computed for each forecast time from the HRRR.

2. Training:

No additional training is required to generate the product.

3. Availability:

The Gate Forecast is available at https://www.aviationweather.gov/trafficflowmgmt/gate, and data is updated with each run of the HRRR model (hourly). Forecasts are currently available for the following airports*:

Atlanta International Airport (ATL)	Charlotte International Airport (CLT)	Chicago O'Hare International Airport (ORD)
Dallas/Fort Worth International Airport (DFW)	Denver International Airport (DEN)	Detroit Metropolitan Airport (DTW)
Houston Intercontinental Airport (IAH)	Las Vegas International Airport (LAS)	Memphis International Airport (MEM)
Miami International Airport (MIA)	Minneapolis-St. Paul International Airport (MSP)	New York City (NYC)
Phoenix Sky Harbor International Airport (PHX)	Washington National Airport (DCA)	

*Additional airports may be added in the future.