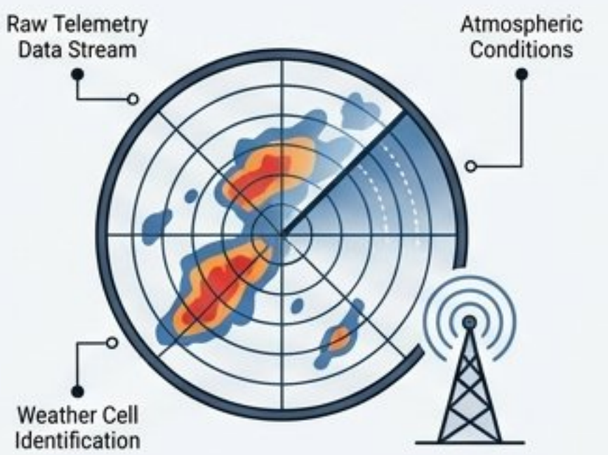
Storm Chaser Operations Manual

Automated PTZ Targeting for Severe Weather Tracking

The Anatomy of Automated Tracking

Storm Chaser acts as an autonomous director, continuously pulling raw weather telemetry, evaluating atmospheric threat levels, and driving robotic cameras to frame the most critical cells.

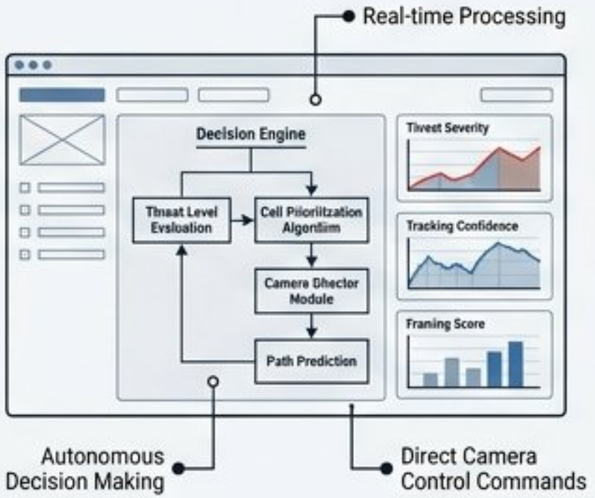
INPUT



Meteorological API

Data Ingestion Point

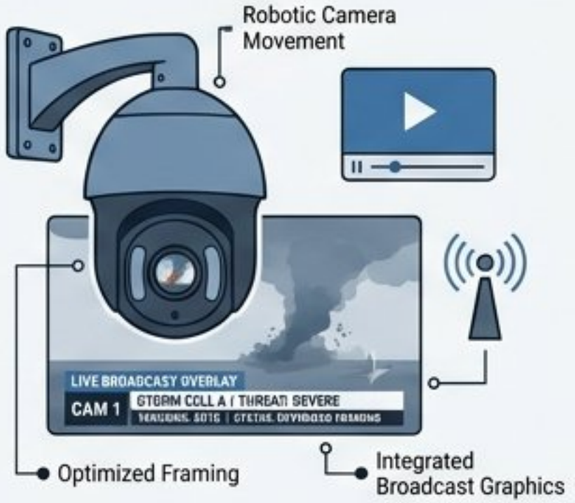
BRAIN



Storm Chaser Logic

Core Processing Unit

OUTPUT

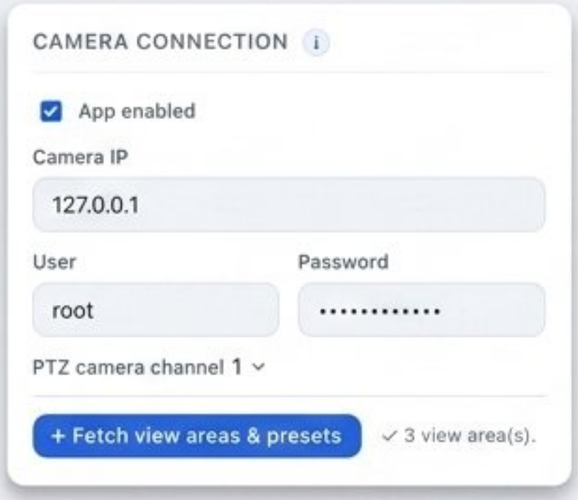


Axis PTZ Hardware & Overlays

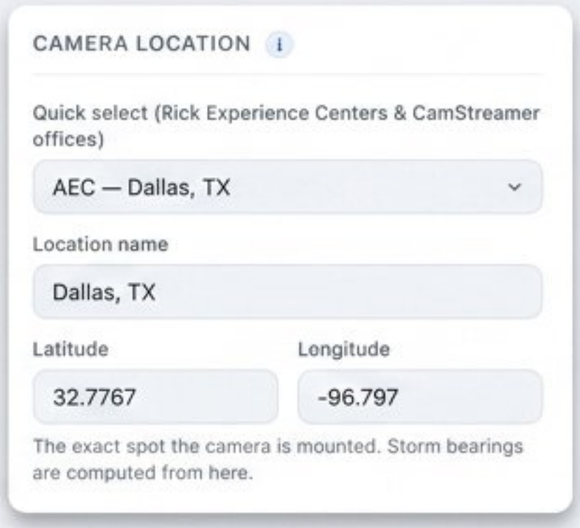
Execution & Visualization

Anchoring the Command Center

All automated pan and tilt bearings are calculated relative to the camera's exact physical coordinates.



- **System Handshake**: Verify the target camera via IP (e.g., 127.0.0.1) and designate the specific PTZ channel.

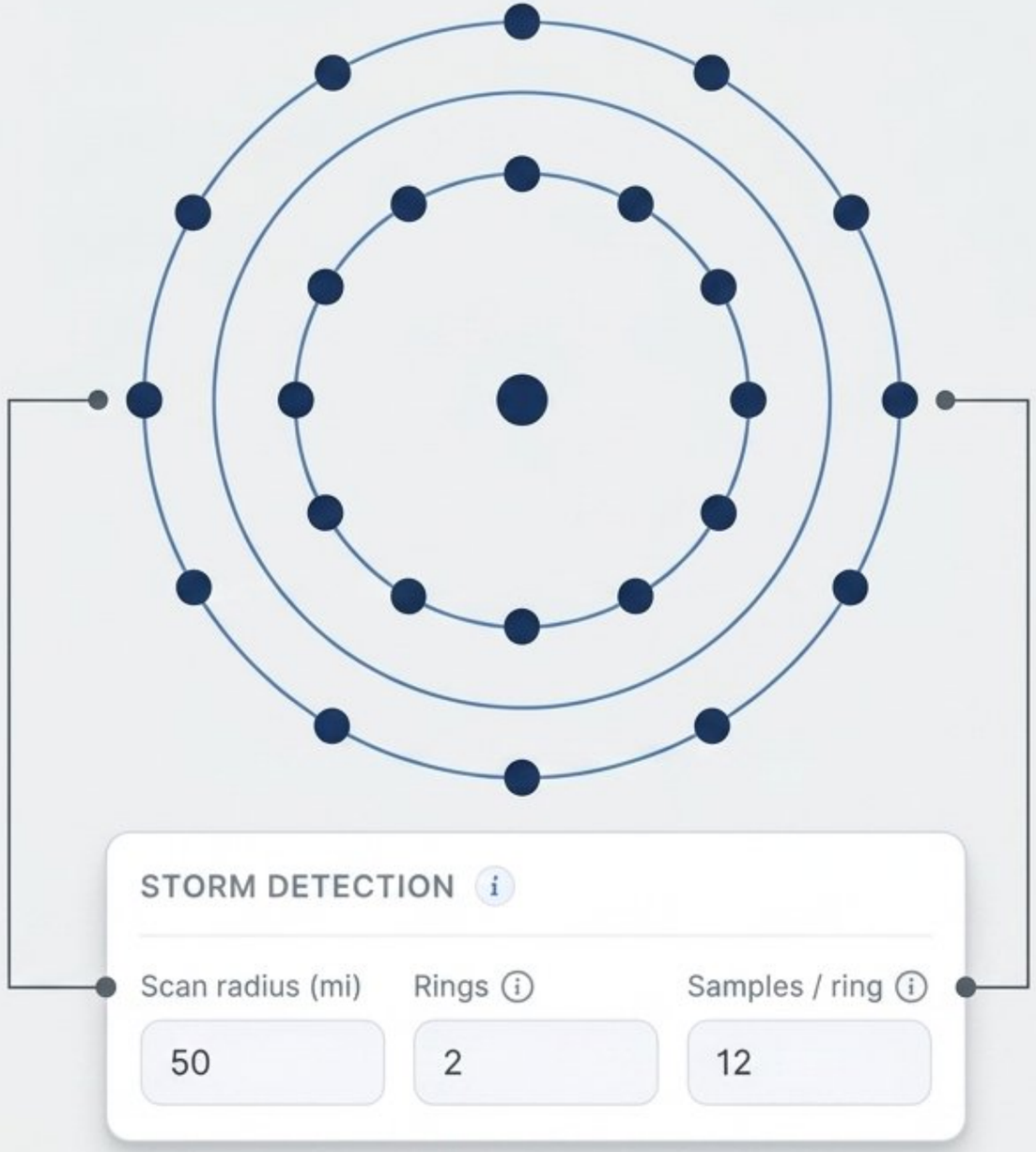


- **Geospatial Anchor**: Define the exact deployment site. Input precise Latitude (e.g., 32.7767) and Longitude (e.g., -96.797). Accuracy here dictates the precision of all subsequent storm tracking geometry.

Casting the Digital Net

The system does not arbitrarily scan the horizon; it builds a highly structured grid of probe points to sample atmospheric data.

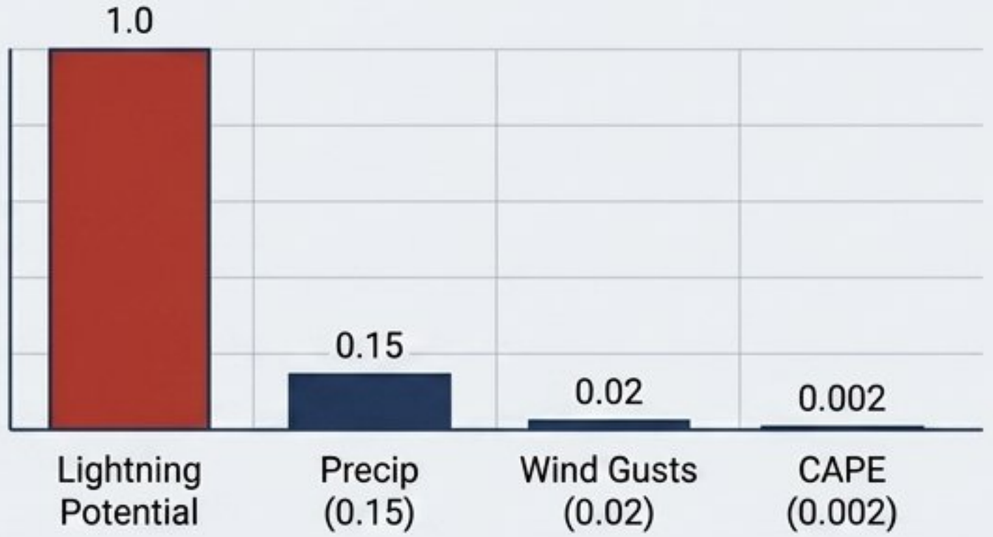
- **Scan Radius:** Determines the maximum engagement distance (e.g., 50 miles).
- **Geometric Grid:** Dividing the radius into 2 Rings with 12 Samples per ring generates exactly 24 localized probe points.
- **Data Load:** This 24-point grid generates an estimated 6,912 API calls per day to maintain real-time telemetry without overloading the data pipeline.



Defining the Threat Matrix

When multiple cells exist within the scan radius, the algorithm computes an aggregate threat score to lock onto the dominant target.

Atmospheric Weights



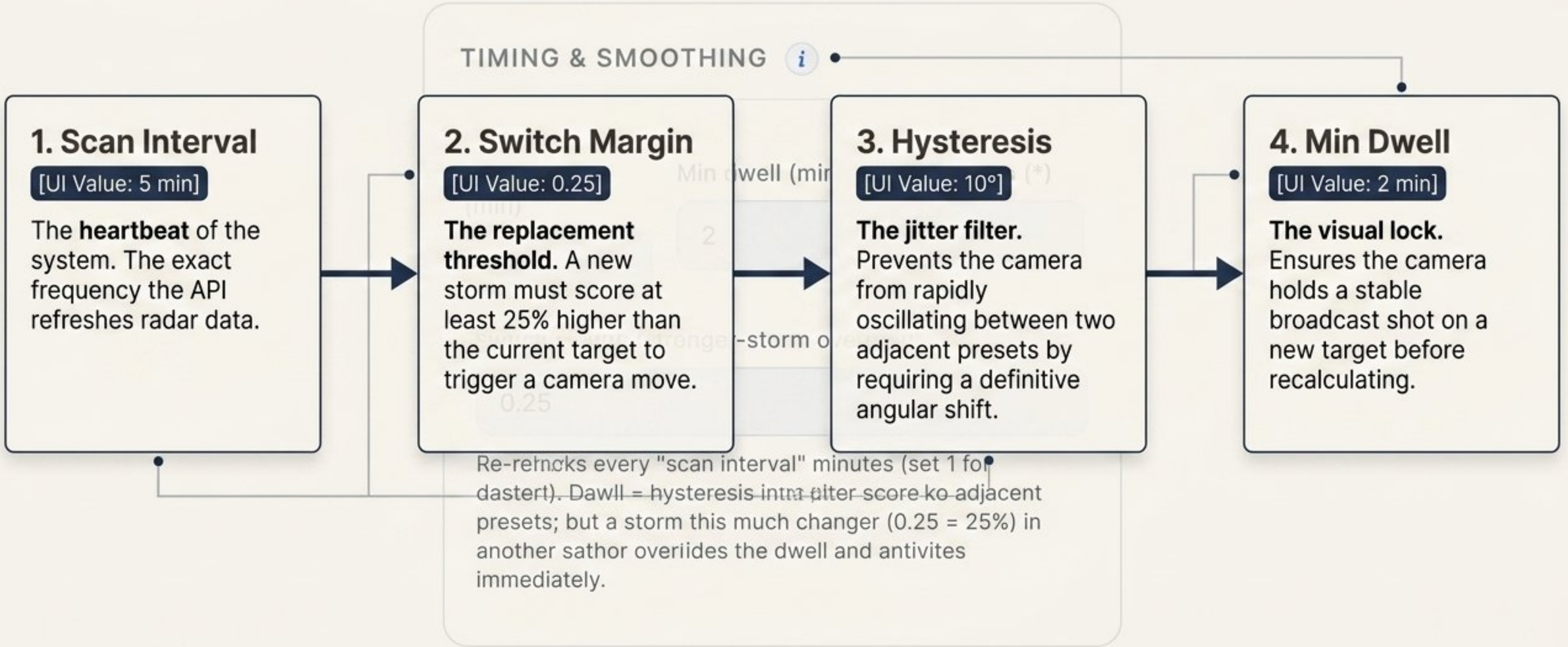
Atmospheric Weights: The algorithm biases heavily toward active electrical storms and heavy precipitation cells, while factoring in updraft energy (CAPE) and wind variables.

The Red Alert Override

The Red Alert Override: Enabling NWS Severe-Weather Warnings allows confirmed tornadoes, severe thunderstorms, and hurricanes to instantly override standard algorithmic scoring, forcing the camera to the most urgent local threat.

The Targeting Decision Loop

To prevent chaotic panning between competing storm cells, the application forces a disciplined evaluation cycle.



Choosing the Engagement Strategy

Three distinct operational modes dictate how the robotic hardware physically tracks atmospheric targets.

PTZ Presets

- **Movement:** Jumps to pre-defined sector slices.
- **Visual Geometry:** Divides the coverage area into colored wedges.
- **Best For:** Fixed architectural constraints where only specific viewing corridors are clear of obstructions.

PTZ Tracking

- **Movement:** Fluid, continuous pan, tilt, and zoom.
- **Visual Geometry:** A single, dynamic targeting line.
- **Best For:** Unobstructed 360° roof mounts requiring pinpoint centering on storm coordinates.

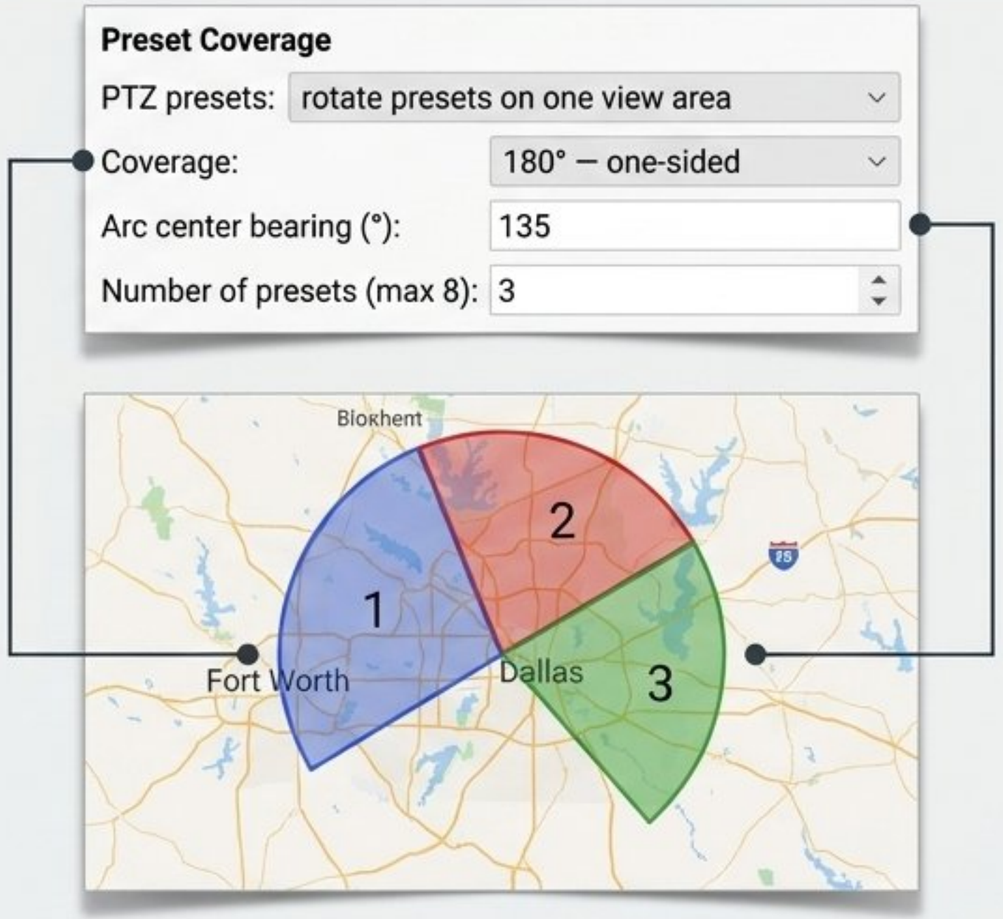
CamSwitcher Views

- **Movement:** Switches entirely between distinct camera units/playlists.
- **Visual Geometry:** Maps colored pins to specific directional playlists.
- **Best For:** Multi-camera broadcast environments spanning different compass headings.

Executing Sector Defense: PTZ Presets

This mode divides your visible horizon into actionable slices. The camera jumps to the preset that owns the sector containing the highest-scoring storm.

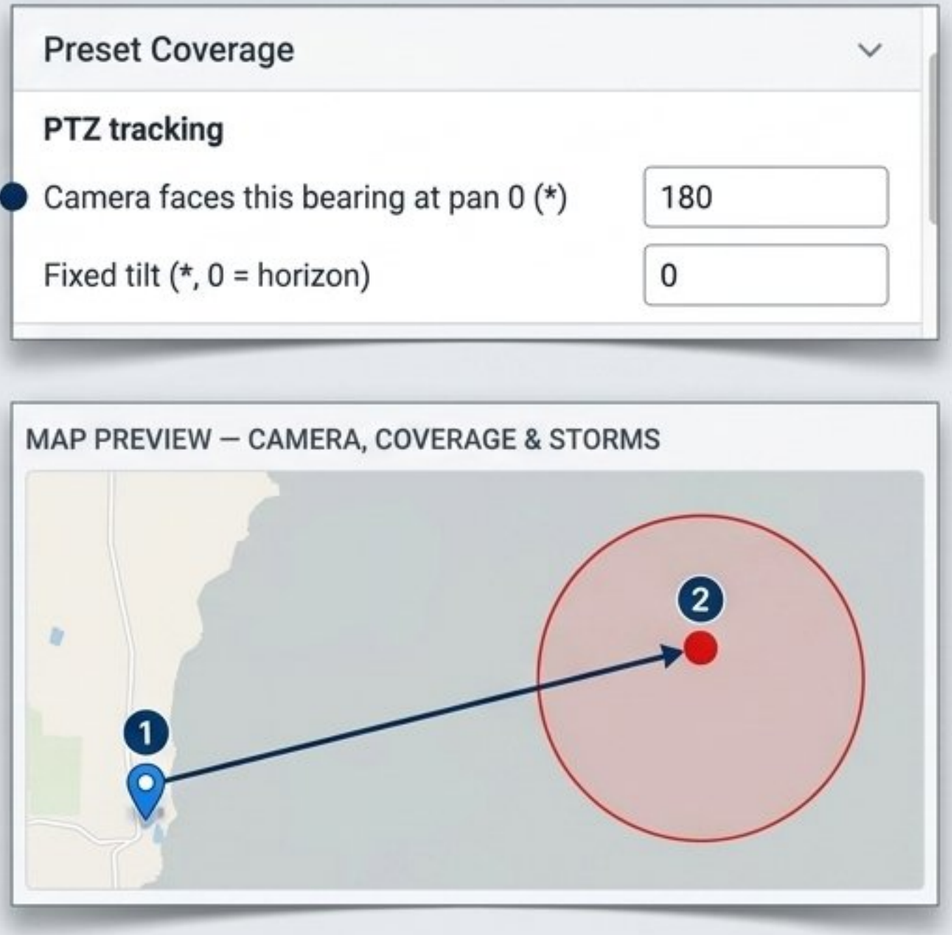
- Define the total visible Coverage (e.g., a 180º view area).
- Set the Arc Center Bearing (e.g., 135º SE) to orient the middle of your coverage.
- The system automatically subdivides this arc. Any storms detected outside the defined geometric wedges are aggressively ignored.



Executing Fluid Pursuit: PTZ Tracking

For unobstructed deployments, the system abandons fixed sectors and dynamically calculates exact pan/tilt coordinates in real time.

- **True North Calibration:** The system must know exactly where the camera's mechanical "0" point rests (e.g., facing 180° South). All pursuit tracking is calcllated relative to this anchor.
- **Distance-Based Zooming:** By defining "near" and "far" zoom percentages, the lens automatically pulls wide for close-proximity cells and pushes in tight for distant threats.

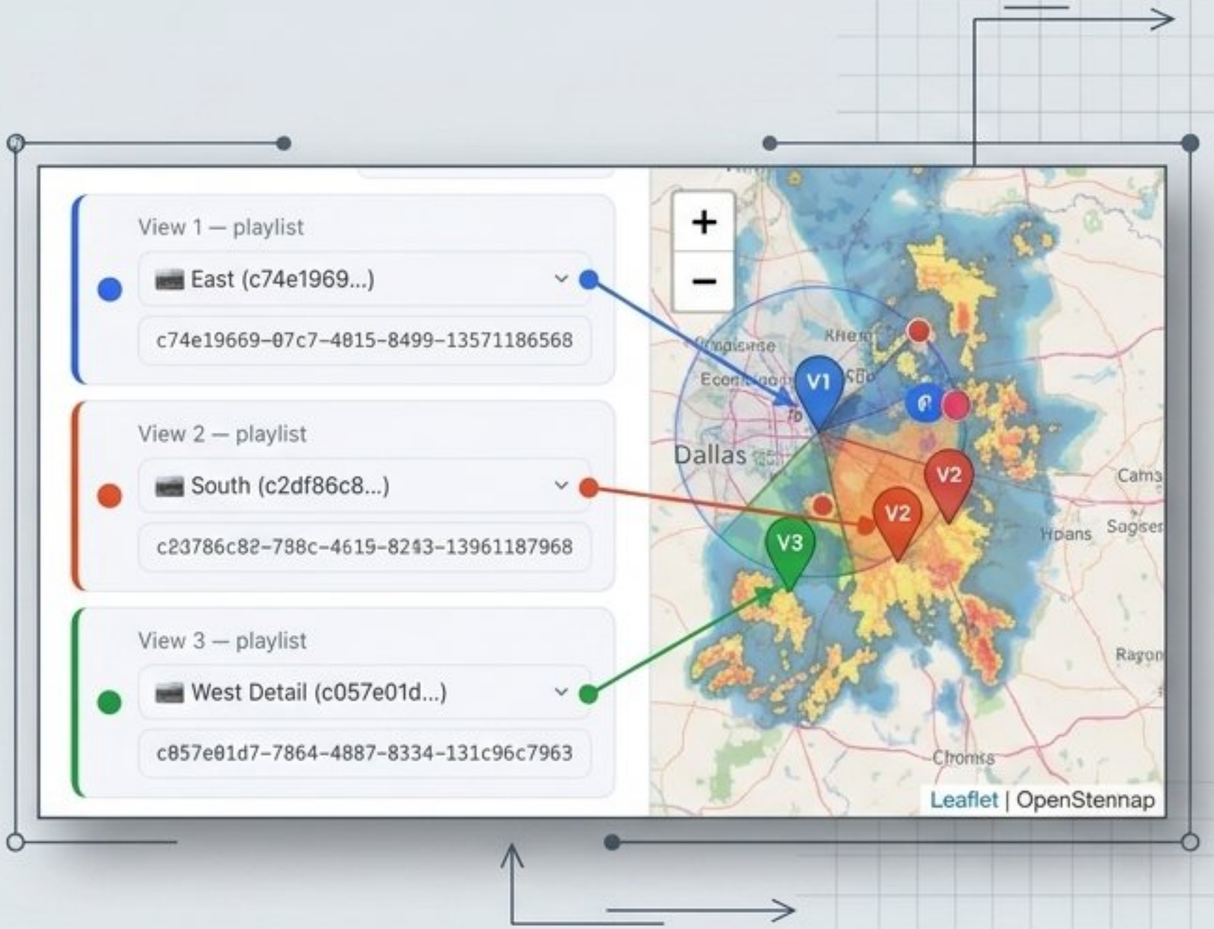


Orchestrating Multi-View: CamSwitcher

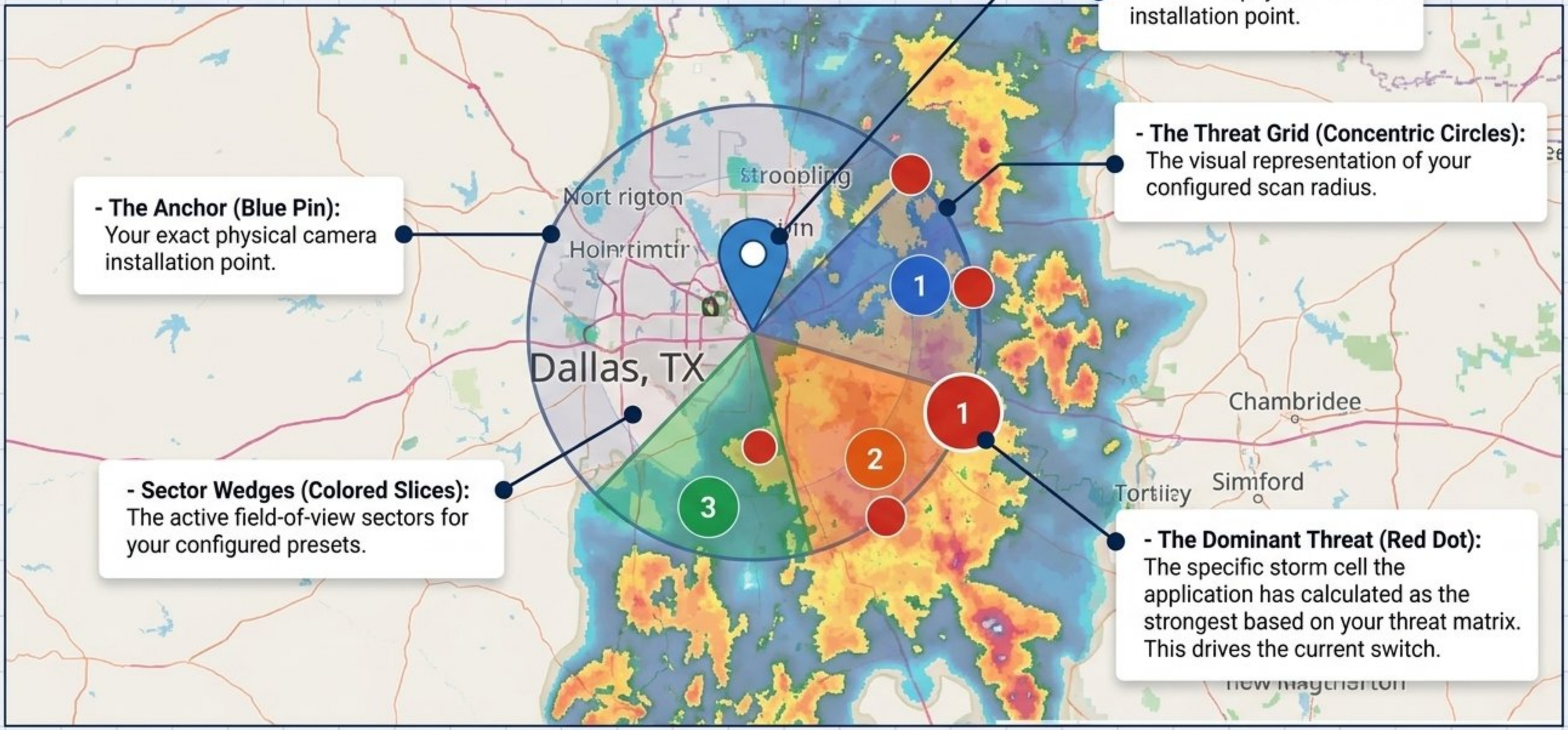
Ideal for complex broadcast environments, this mode abandons PTZ movement entirely, instead switching the live feed between distinct pre-programmed camera views based on storm location.

- **Directional Mapping:** Assign a specific CamSwitcher playlist to an exact geographic bearing (e.g., Playlist 1 faces 75° ENE).

- **The Switch Logic:** When the dominant storm cell moves, the system calculates the bearing and seamlessly cuts the broadcast to the playlist whose assigned heading most closely matches the threat vector.



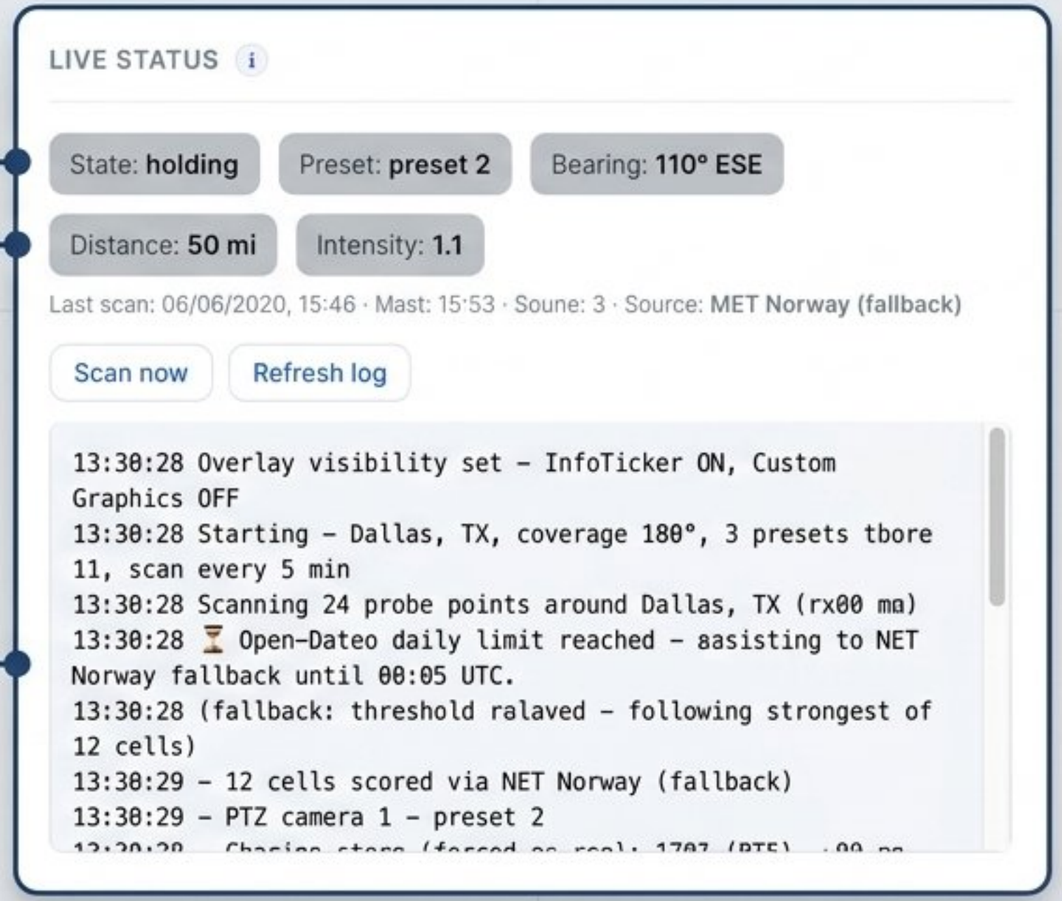
Decoding the Tactical Map



Reading the Live Console

The status interface provides immediate confirmation of the algorithmic decision loop and mechanical execution.

- **Current State:** Confirms if the camera is actively tracking a moving target or holding on a stationary dwell period.
- **Target Telemetry:** Displays the exact **Bearing** (e.g., **110° ESE**), **Distance** (e.g., **50 mi**), and algorithmic **Intensity score** (e.g., **1.1**) of the currently locked cell.
- **System Log:** A real-time ledger of API probe results, threshold checks, and forced overrides, vital for tuning hysteresis and switch margins.



Broadcasting Live Telemetry

Transform internal targeting data into on-screen broadcast intelligence.

- **Dynamic Infotickers:** Pipe live targeting variables directly into CamOverlay templates.

- **Automated Updates:** Variables for {bearing}, {distance}, {intensity}, and {status} update in real time as the camera tracks, ensuring viewers always have the precise geospatial context of the severe weather on screen.

CAMOVERLAY INFOTICKER (OPTIONAL)

Show live status on overlay

InfoTicker service ID

3

Template

STORM CHASER | Azimut: {bearing}° {(compa

Vars: (status) (bearing) (compass) (distance) (dist_unit) (intensity) [Status) (westion) (time)

Deployment Readiness Checklist

Execute these operational phases in sequence to ensure autonomous stability:

1. **Lock the Base:** Verify IP handshake and input hyper-accurate site Latitude/Longitude.
2. **Cast the Net:** Define the radar grid radius and set the API probe points.
3. **Tune the Matrix:** Set threat weights and enable NWS severe-weather overrides.
4. **Dictate the Strategy:** Select Presets, Tracking, or CamSwitcher based on deployment constraints.
5. **Verify the Map:** Confirm the blue anchor pin, colored geometry, and red threat dots align with the physical horizon.