



CENTER FOR ADVANCED AVIATION SYSTEM DEVELOPMENT (CAASD)

Surveillance and Broadcast Services Coverage

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Terminology

- **Coverage Volume**: an airspace volume within which broadcast services are provided. Service is ordered on a coverage volume basis. A coverage volume contains one or more service volumes.
- **Service Volume**: an airspace volume within which a specific broadcast services application is supported and the associated performance requirements are achieved. A service volume must be within a coverage volume.



Coverage Prioritization Scheme -- Example

- **Downlink (ADS-B, ADS-R)**
 - (1) Replicate all current terminal radar coverage
 - Could prioritize by ops counts or other means
 - (2) Fill gaps to a specified coverage floor
 - Prioritized based on ASDI or other track density metric
- **Could apply above logic by region (East and West)**
- **Uplink (TIS-B, FIS-B) could leverage downlink resources (if same vendor) or consider other valuation schemes**
 - Maximum overlap with Mode S TIS sensors
 - Maximum overlap with existing FISDL coverage
 - Maximum coverage of total GA “flight minutes”
 - AOPA input
 - Volunteering flight schools or FAA/State government BSGS cost sharing partnerships



Characteristics of Coverage Obtained from Ground Sites

- **A low coverage requirement (e.g., ≤ 2000 ft AGL) severely limits site location options**
 - e.g., airport coverage requirement generally requires a site at airport or nearby
- **Coverage deployed for an airport gives coverage to airspace above and around the airport**
- **Should take advantage of this “extended” coverage**

Coverage plan should first select high-priority low-altitude airspace, then fill in elsewhere

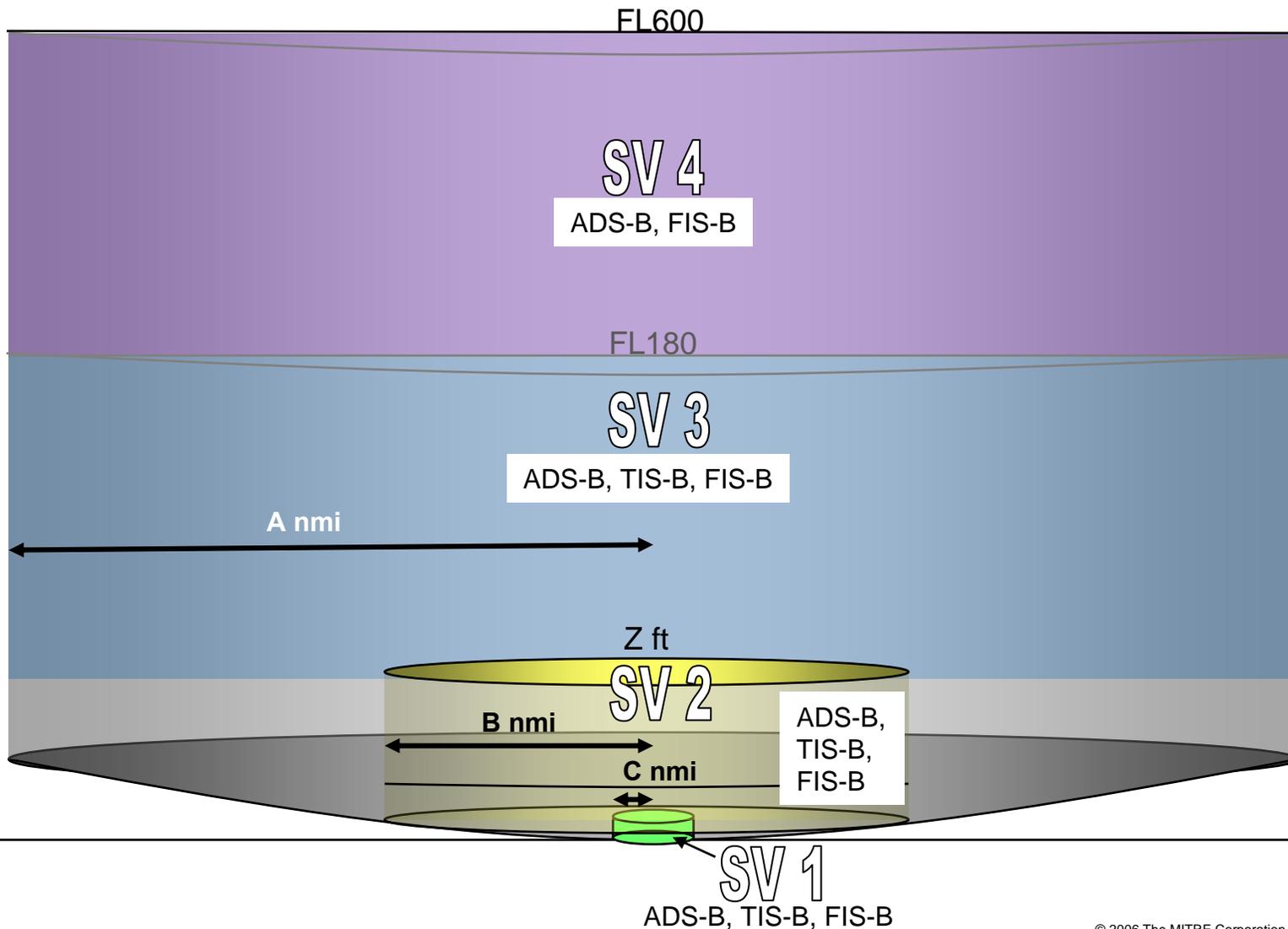


Coverage Volume Shapes -- Example

- **3D Grid**
 - Squares, hexagons, or other shapes over the entire NAS
 - “Turn on” grid sections in phases
- **Static Volumes**
 - Cylinders of varying radii for terminal and surface, cubes with (horizontal) regional and altitude boundaries for en route airspace
 - Order from a menu of finite shapes and sizes
- **Parametric Volumes**
 - Cylinders, cubes, and polygons of various sizes
 - Size and polygon shape defined for a particular service



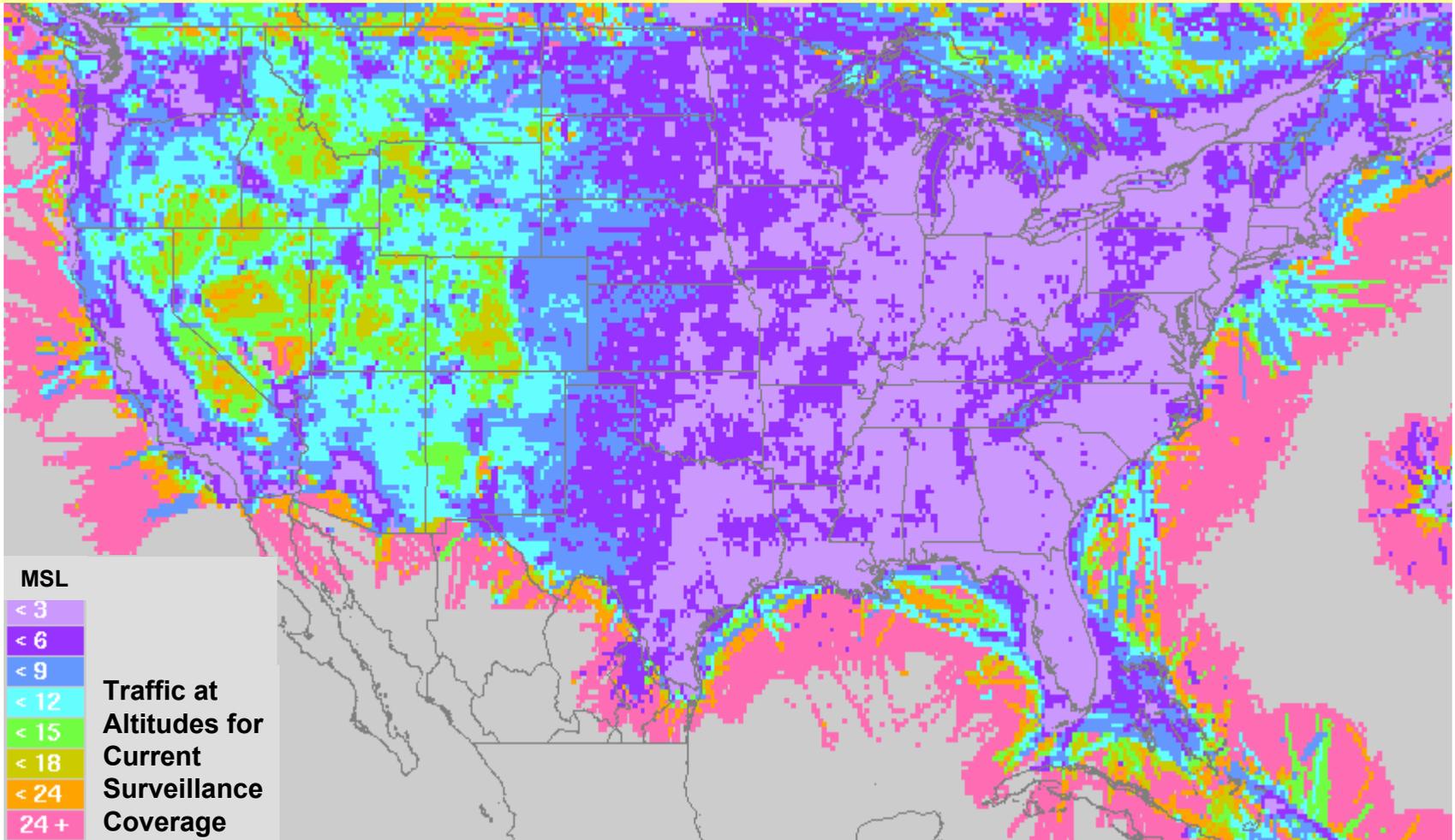
Example Coverage Volume With Multiple Service Volumes





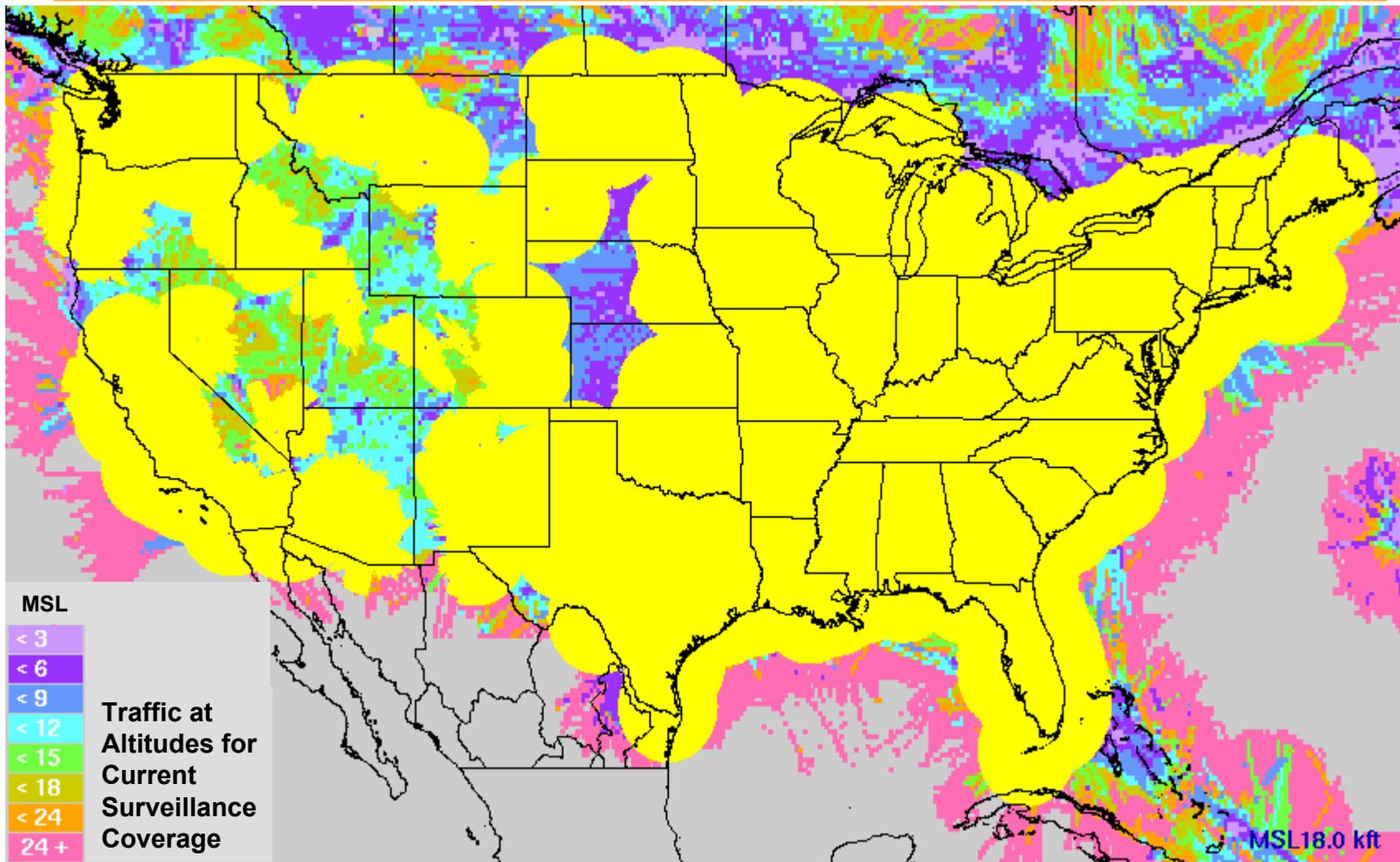
IFR Traffic Seen by Radar Surveillance

October 2005 Lowest IFR Altitude Track Report (ASDI)





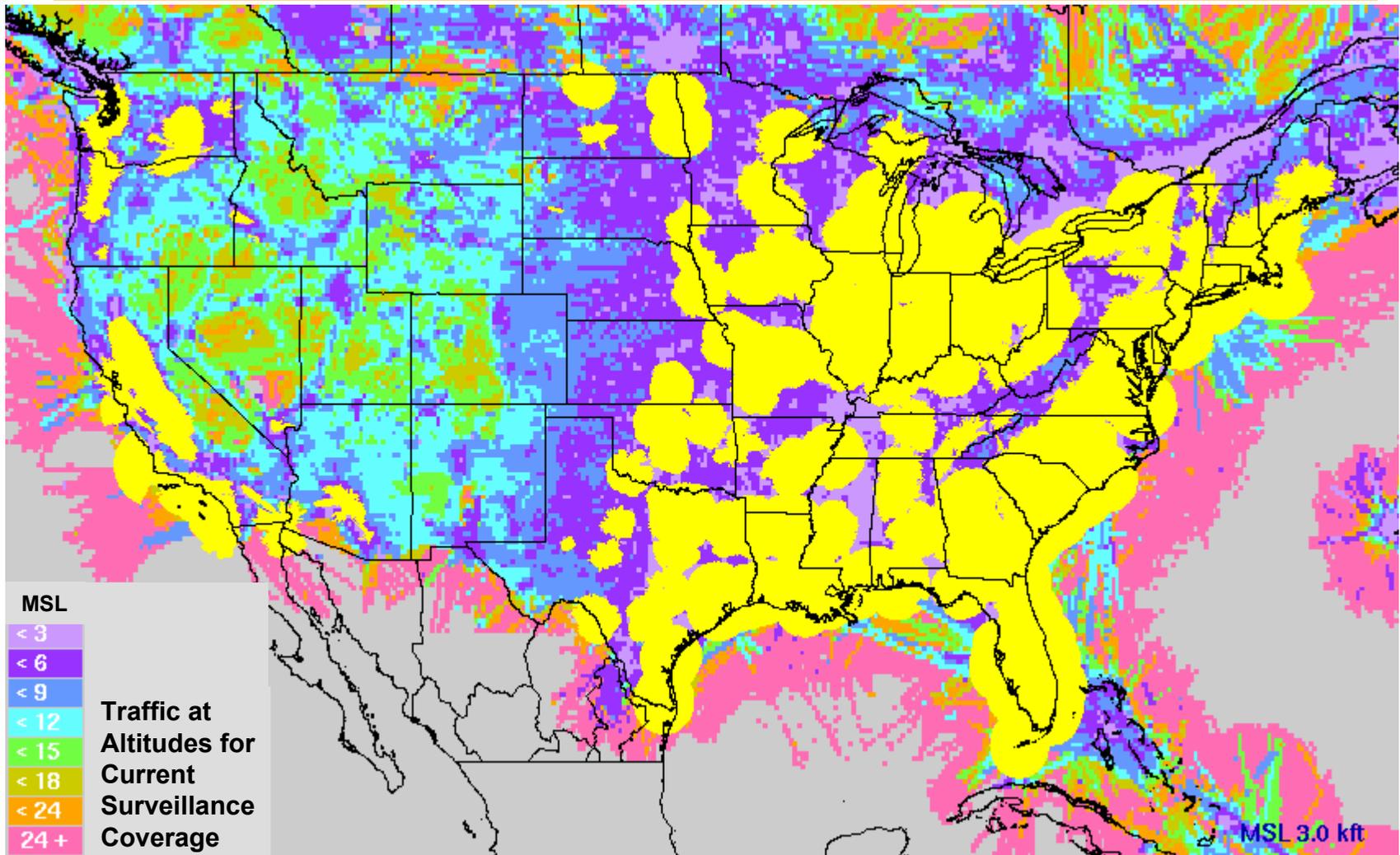
Example ADS-B/Broadcast Services Coverage at FL180 235 Coverage Volumes





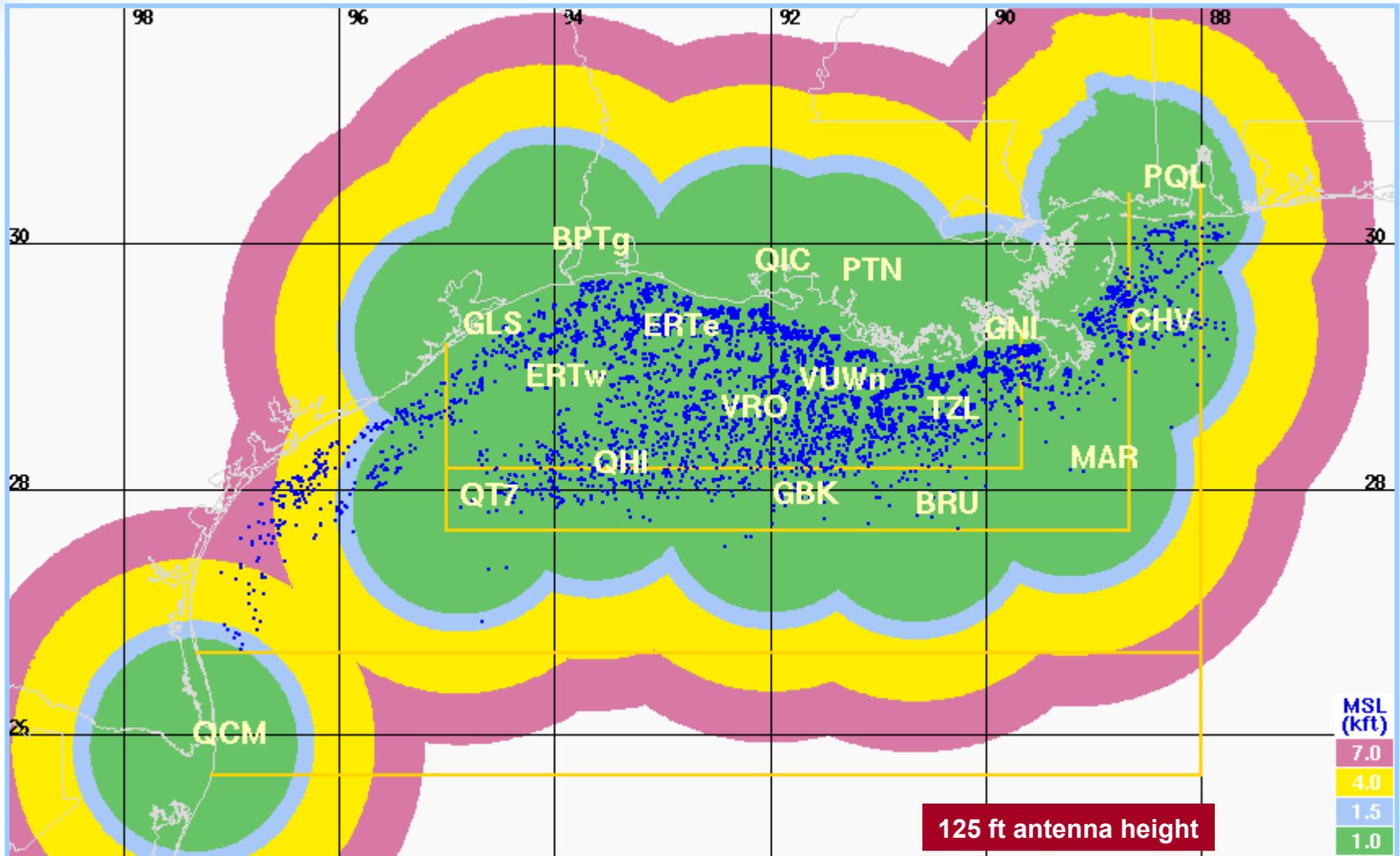
Example ADS-B/Broadcast Service Coverage at 3K MSL

235 Coverage Volumes



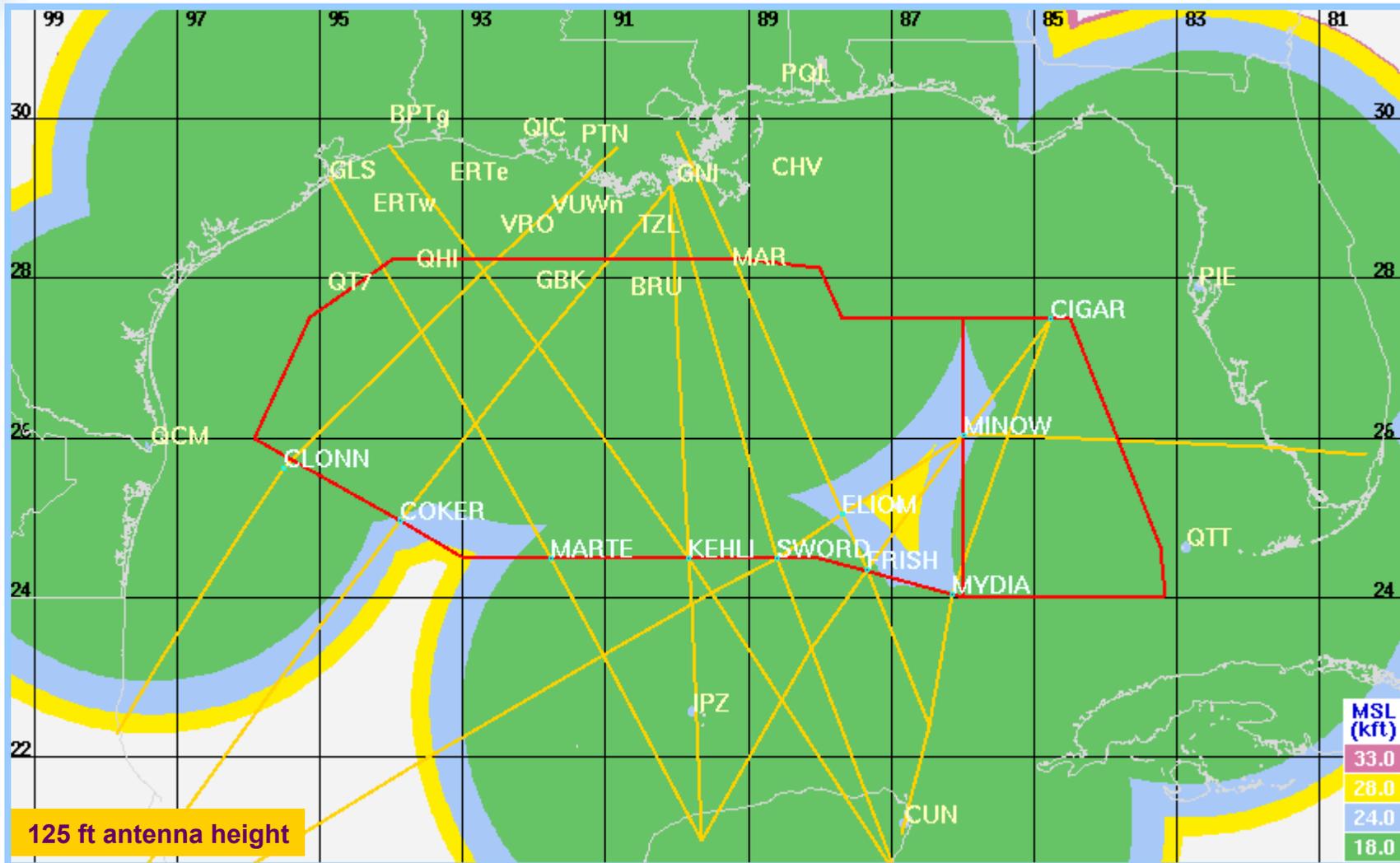


Example GOMEX Segment 1 Coverage for Low-Altitude Operations (1K+ MSL)





Example GOMEX Segment 1 Coverage for High-Altitude Operations (18K+ MSL)





Still to Be Worked Out -- Suggestions Welcomed

- **Coverage volume shapes and sizes**
- **How to exploit overlapping coverage to achieve service availability**
- **Process for instantiating coverage volumes, e.g.,**
 - Submit site information for FAA approval prior to implementation?
 - Use of coverage prediction tools by vendor and FAA
- **FAA acceptance of each service in coverage volume**
 - Appropriate combination of predictive tools and analysis of static platforms or equipped traffic