U.S. Coast Guard Maritime Domain Awareness Sensor Technologies

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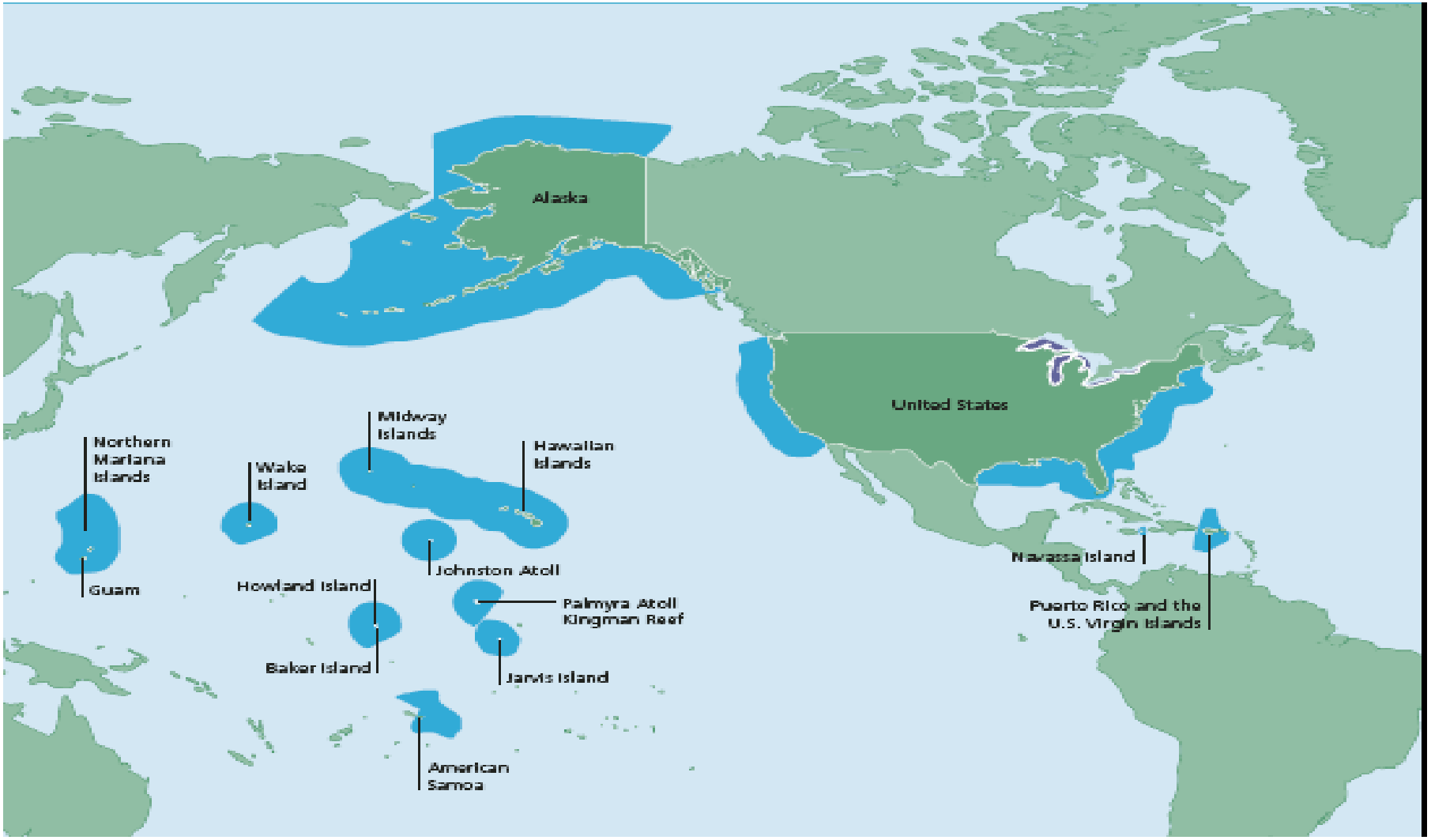
Maritime Domain Awareness (MDA)

…the effective understanding of anything associated with the global maritime domain that could impact the security, safety, economy, or environment

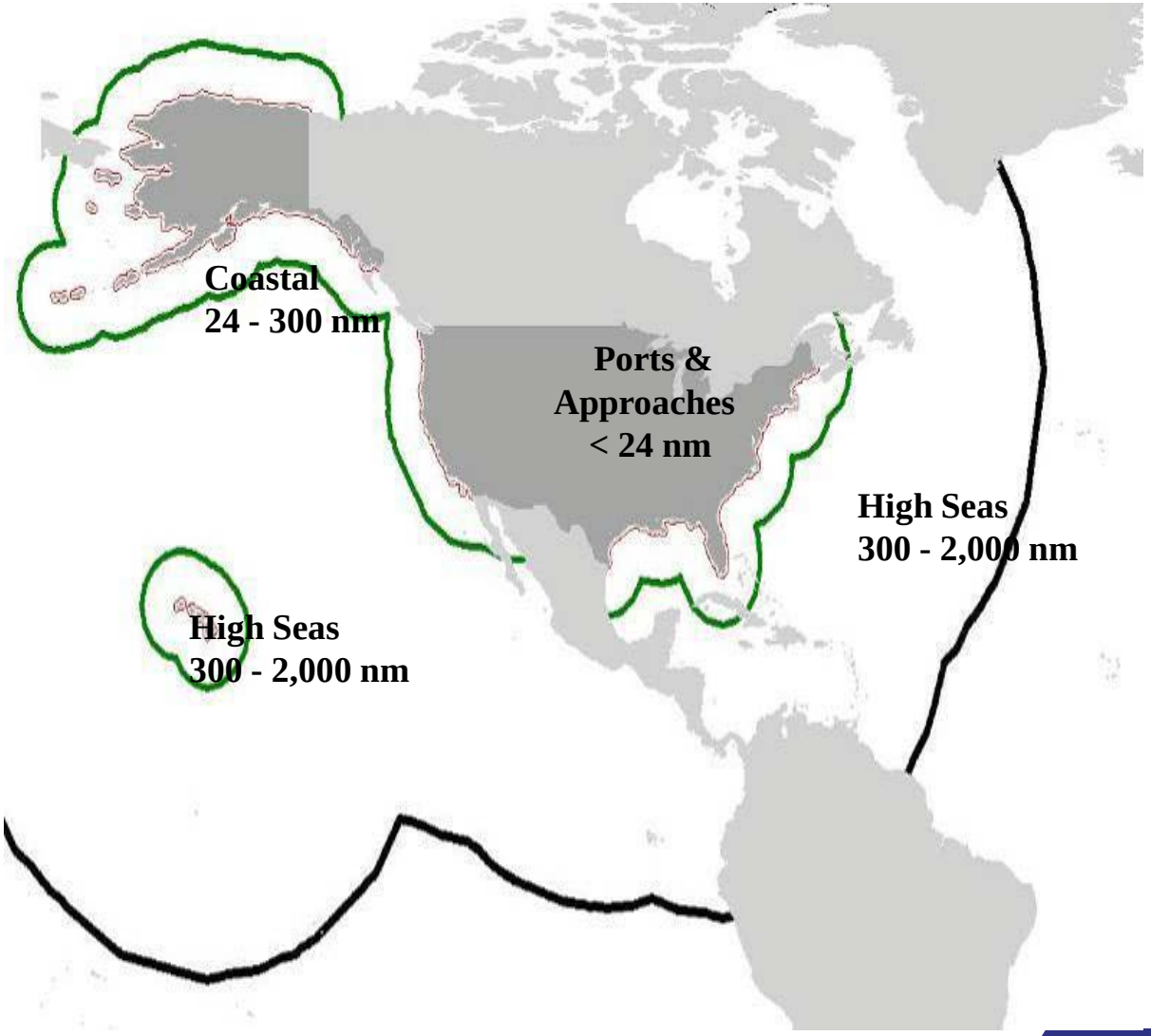
Exclusive Economic Zone (world's largest)



Achieving and Maintaining MDA

Observables	Collect	Fuse	Analyze	Disseminate	Decisions
• Vessels • People • Facilities • Cargo • Infrastructure • Sea lanes • Threats • Friendly forces • Weather	• Sensors • Operators & field personnel • Intel Sources • Open source • Private sector data • Law enforcement	• Tracks w/ tracks • Data w/ data • Tracks w/ data	• Anomaly detection • Pattern recog & analysis • Compare w/ rules • Research tools	• Networks • Displays (COP/UDOP) • Command centers	• Strategic • Operational • Tactical

Layered MDA


Coastal
24 - 300 nm
Ports &
Approaches
< 24 nm
High Seas
300 - 2,000 nm
High Seas
300 - 2,000 nm

Layered MDA Sensor Coverage Areas

CG Enterprise

Long Range Identification and Tracking

- Global position reporting per SOLAS regulations.
- 4 daily broadcasts per IMO
- 160+ contracting governments participating in LRIT efforts
- Track 40,000+ SOLAS Class vessels globally
- Satellite-based reporting.

Nationwide Automated Identification System

- Nationwide network of towers & transceivers
- Similar to aircraft transponders
- VHF radio-based (line of sight technology), self-generated vessel reports per IMO/SOLAS
- Provides AIS data feed to CG enterprise data stores.
- Inside 50 NM: near real time reports (seconds/minutes).
- Inside 2000NM: less frequent satellite based coverage.

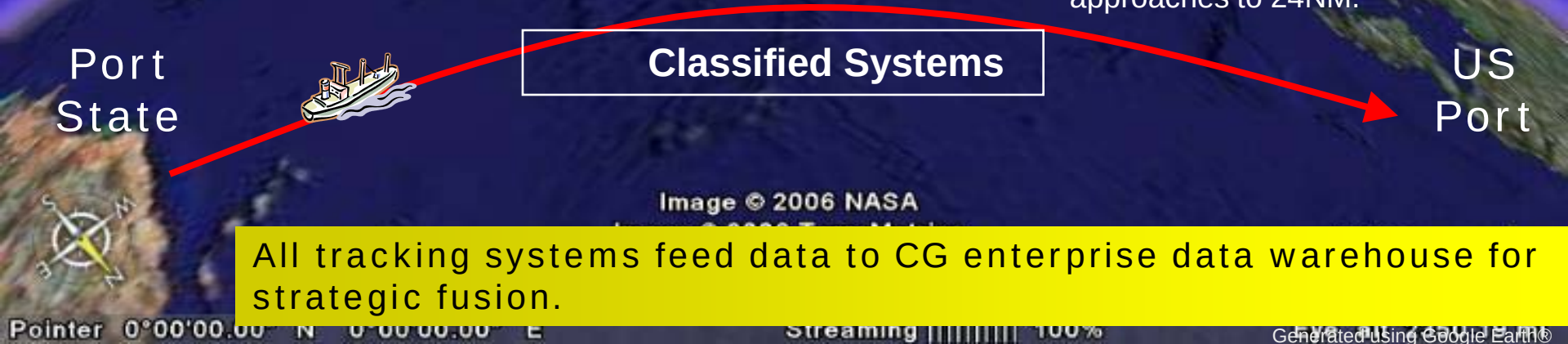
IOC

- Command Center monitors vessel behavior with radars and cameras.
- Corroborate vessel behavior with actions advertised in LRIT/NAIS and in ship reports
- Joint planning and ops tools
- Real-time op decision support.
- Covers critical port/coastal approaches to 24NM.

Classified Systems

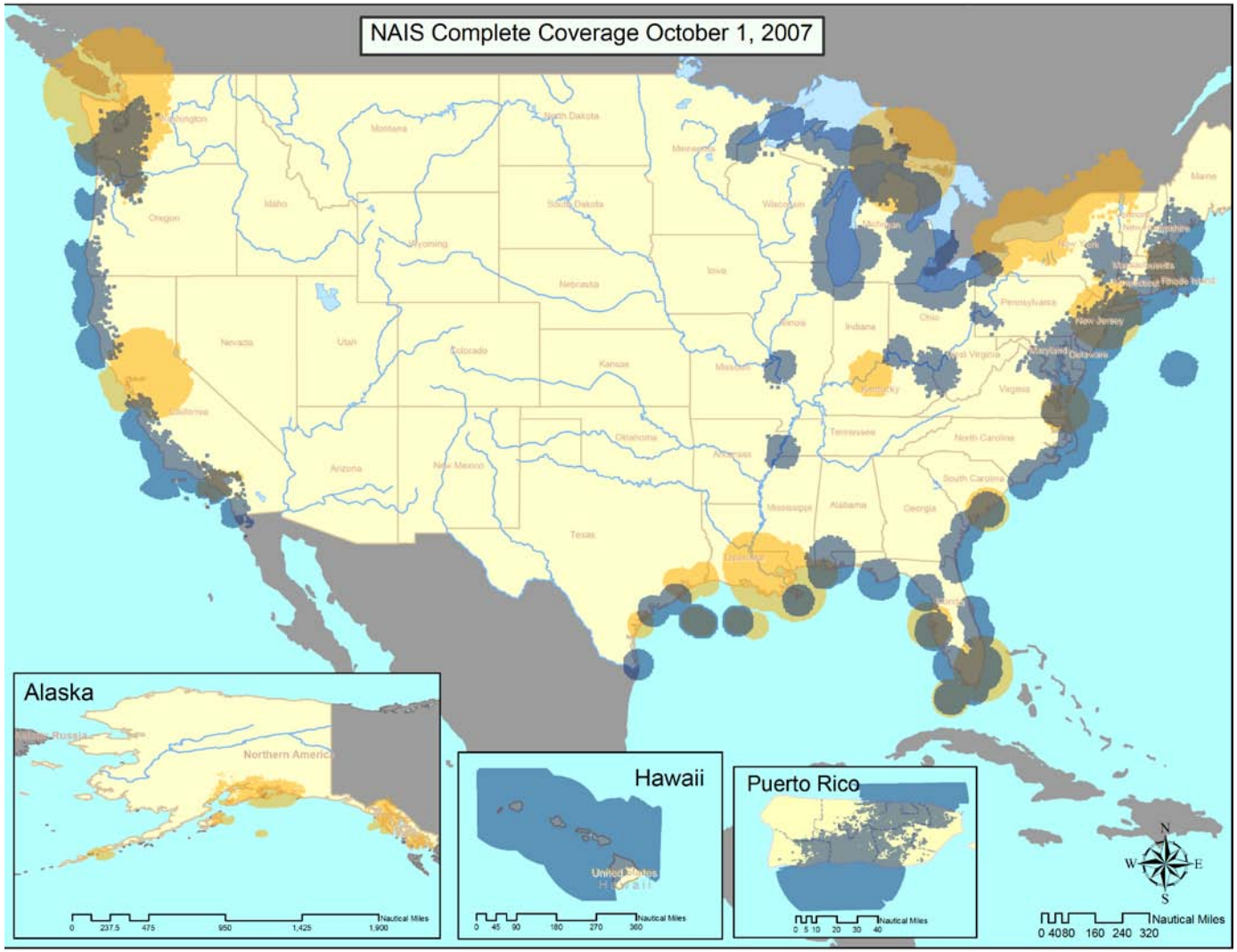
Port State

US Port



All tracking systems feed data to CG enterprise data warehouse for strategic fusion.

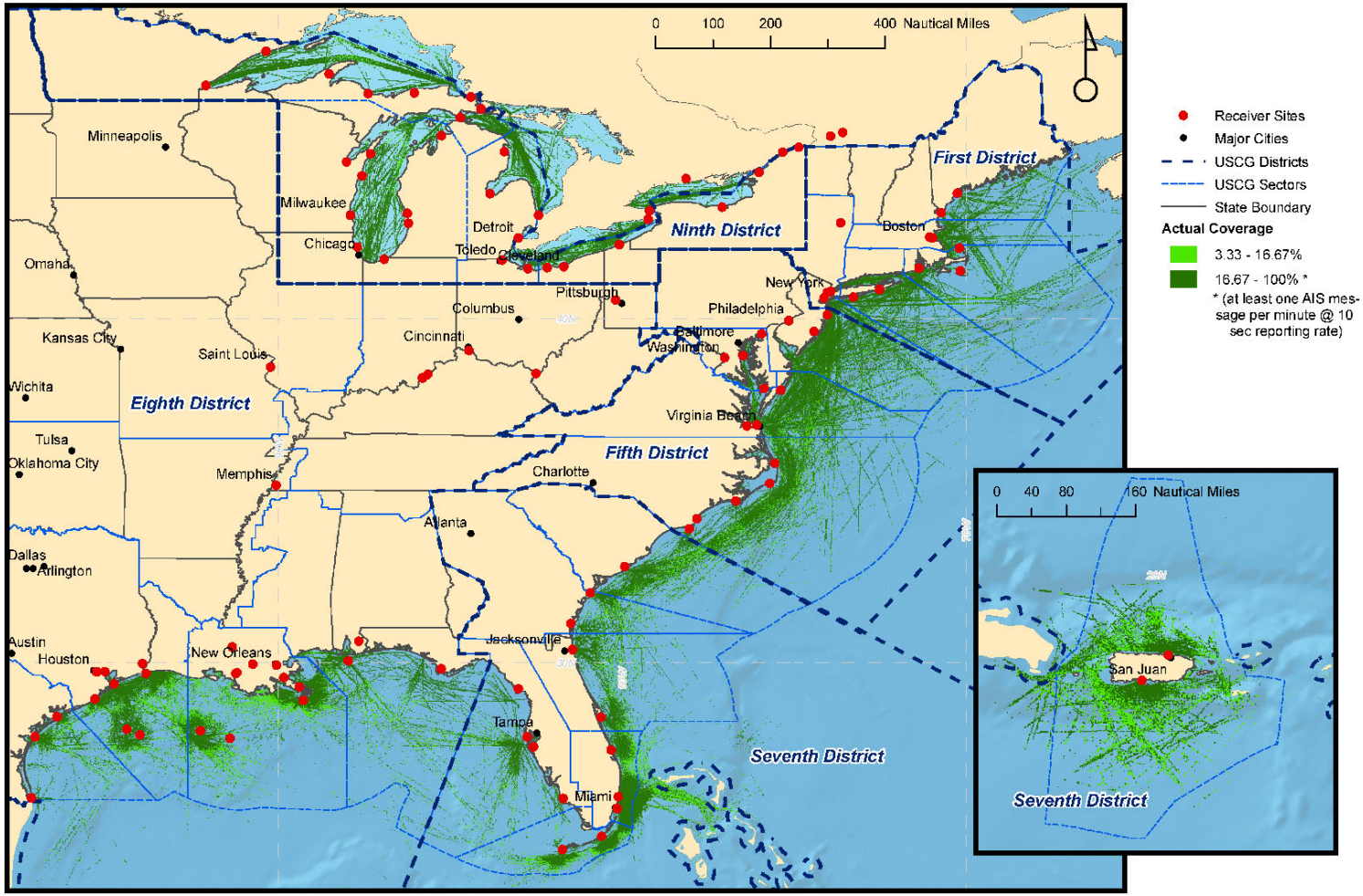
Current AIS Capability



United States Coast Guard
U.S. Department of Homeland Security

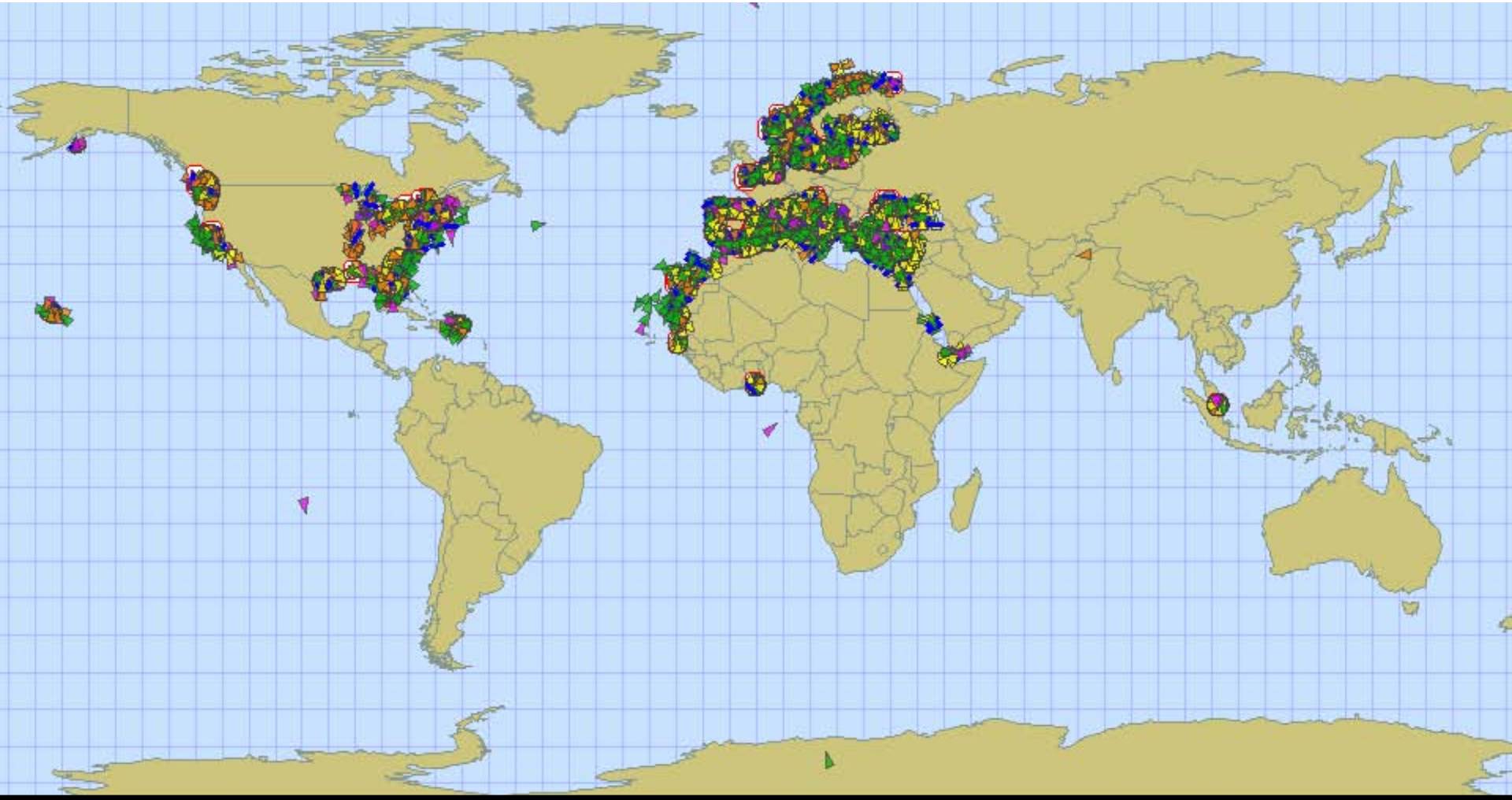
EAST COAST AND PUERTO RICO

NAIS I-1 Actual Coverage for 01-16 October 2007

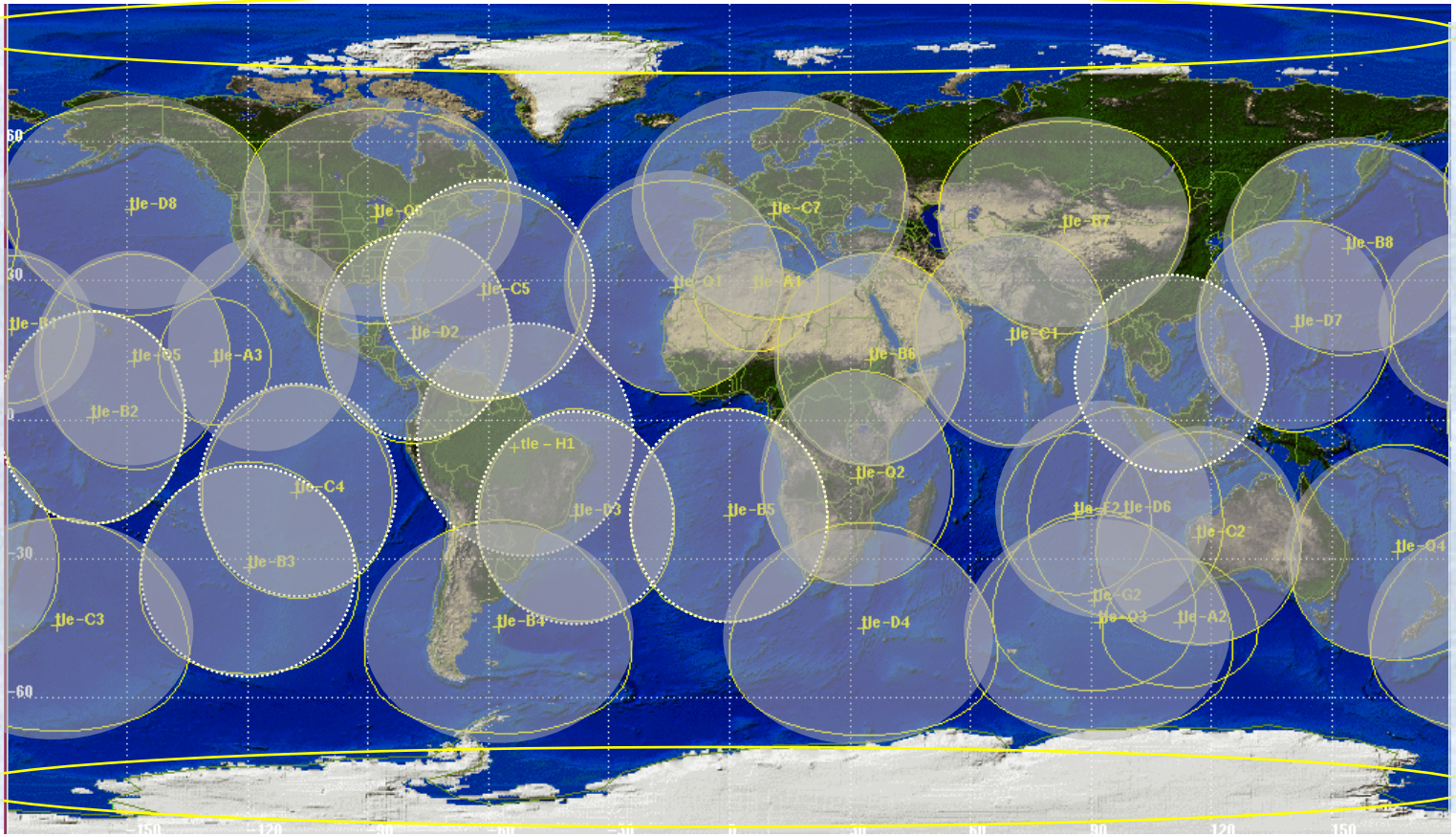


International AIS Information Sharing

Maritime Security and Safety Information System (MSSIS)



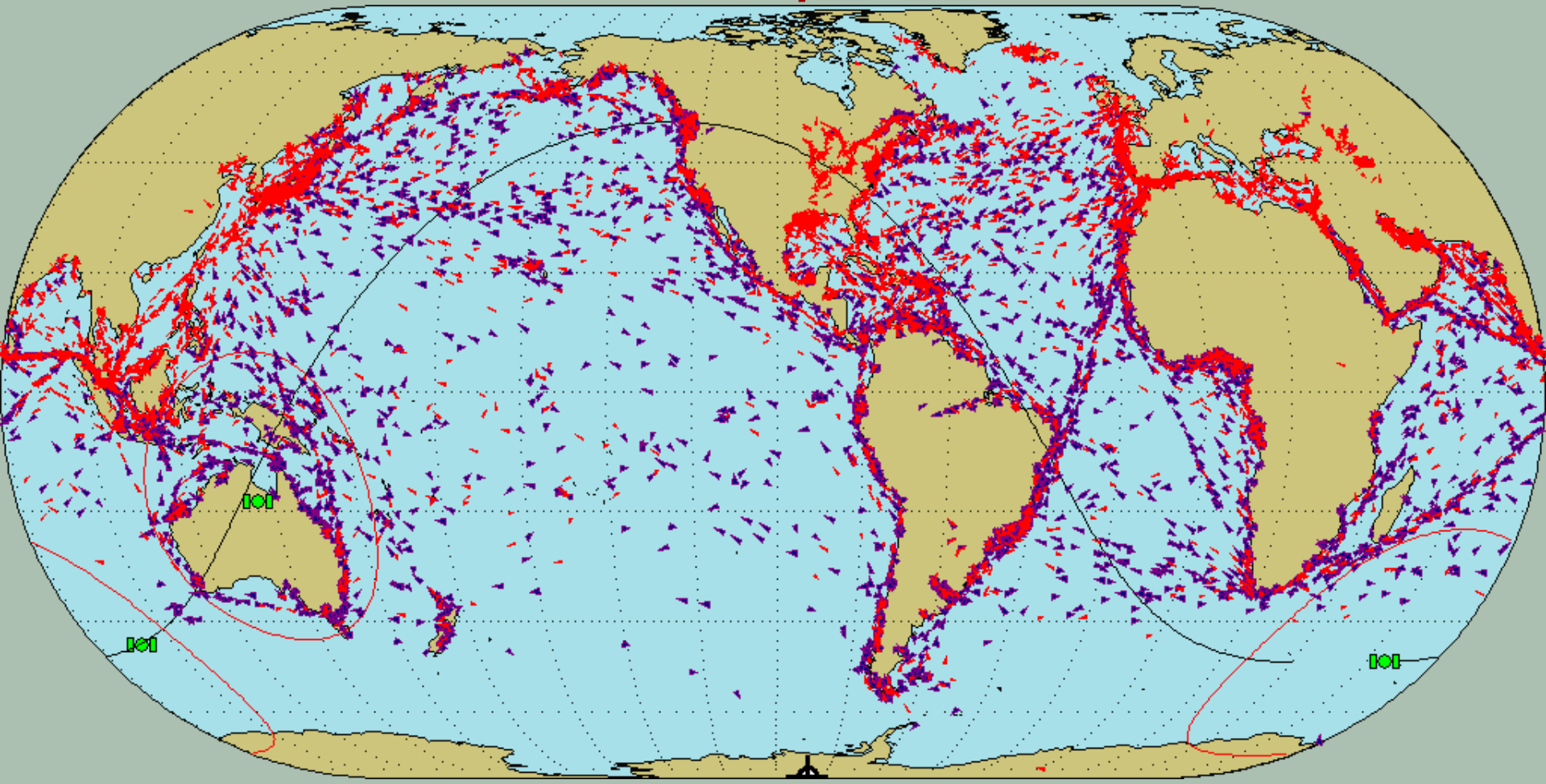
AIS Via Commercial LEO Satellite



Unclassified

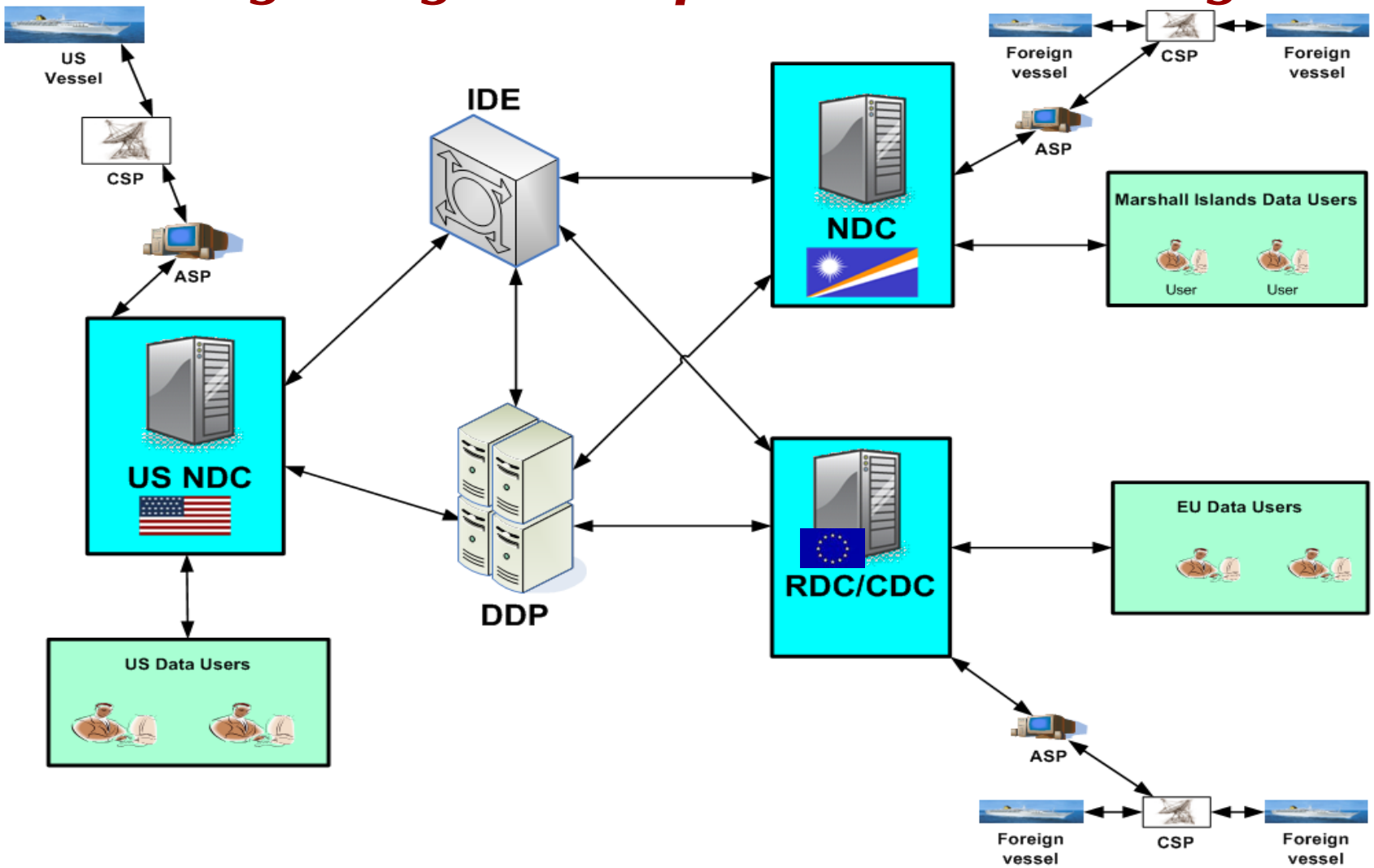
Commercial AIS - 24 hour period

Combined data of 2 satellites

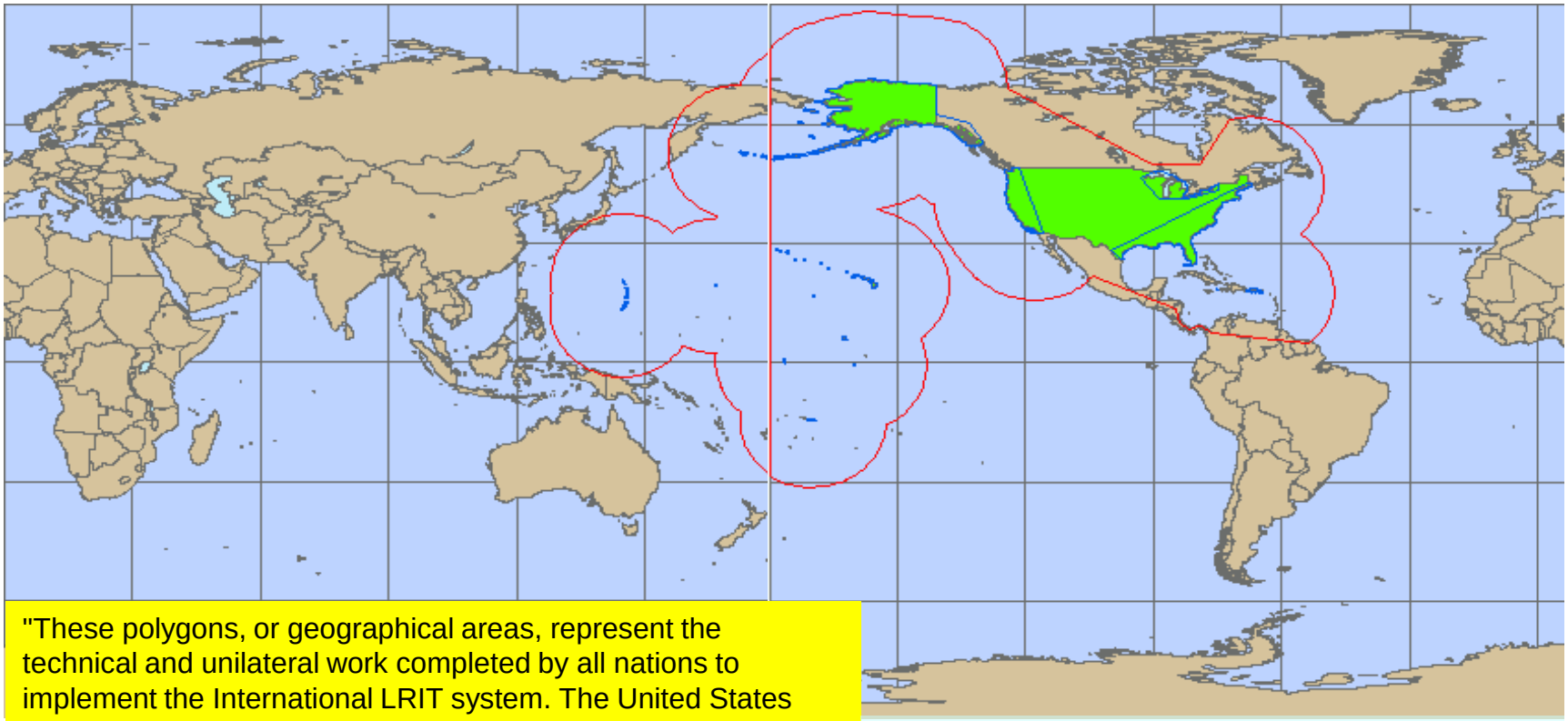


Time of screen capture: 13:16 UTC
5 November 2008
Vessel count: 11928

Long Range Identification & Tracking



Long Range Identification & Tracking



"These polygons, or geographical areas, represent the technical and unilateral work completed by all nations to implement the International LRIT system. The United States geographical areas depicted are for technical LRIT system and access to LRIT information purposes ONLY. They do not represent maritime jurisdictional areas for any other purpose, AND MAY NOT BE USED TO SUPPORT JURISDICTIONAL CLAIMS OR BOUNDARY LINES FOR ANY OTHER PURPOSE."

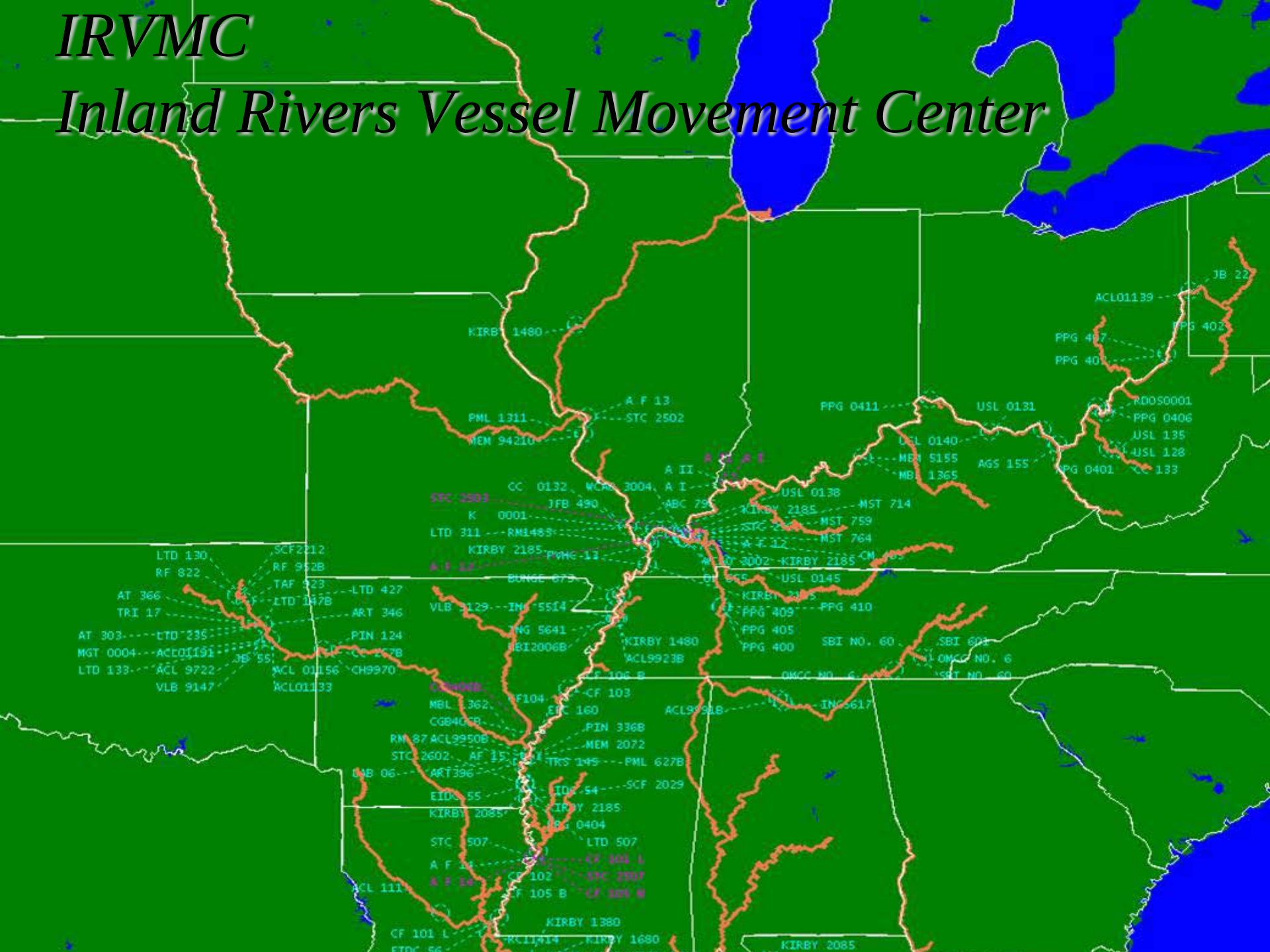
Green polygons = U.S. Baseline

Blue hollow polygons = U.S. Territorial Seas

Red hollow polygons = U.S. 1000 NM Boundary

IRVMC

Inland Rivers Vessel Movement Center



Interagency Operations Centers

Requirements

See

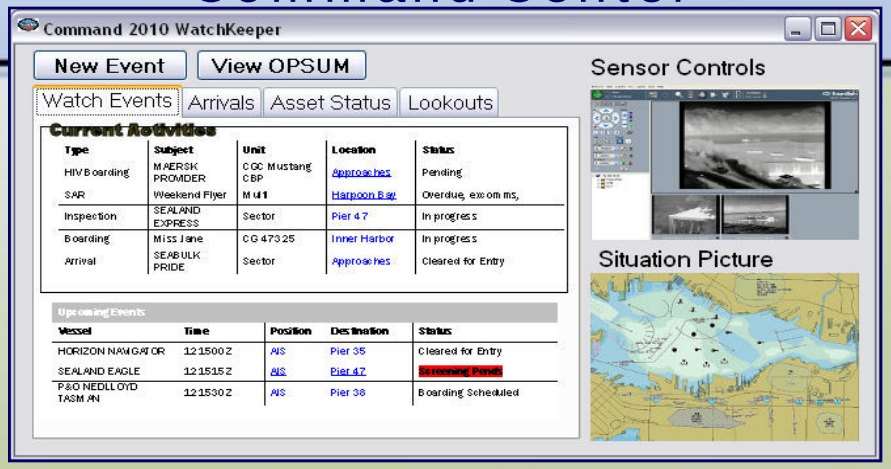
Radar

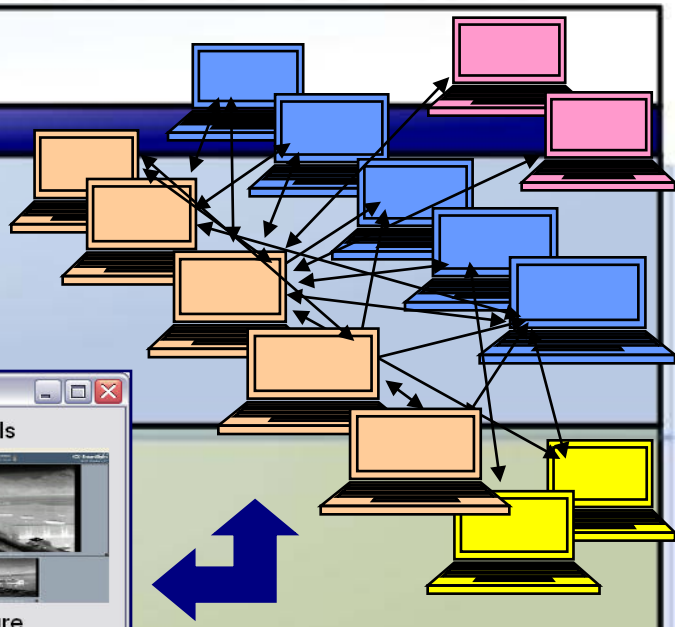
Camera

Understand

Sensor Control and Processing

Command Center





Data Integration and Presentation

Share

Collaboration

Situational Awareness

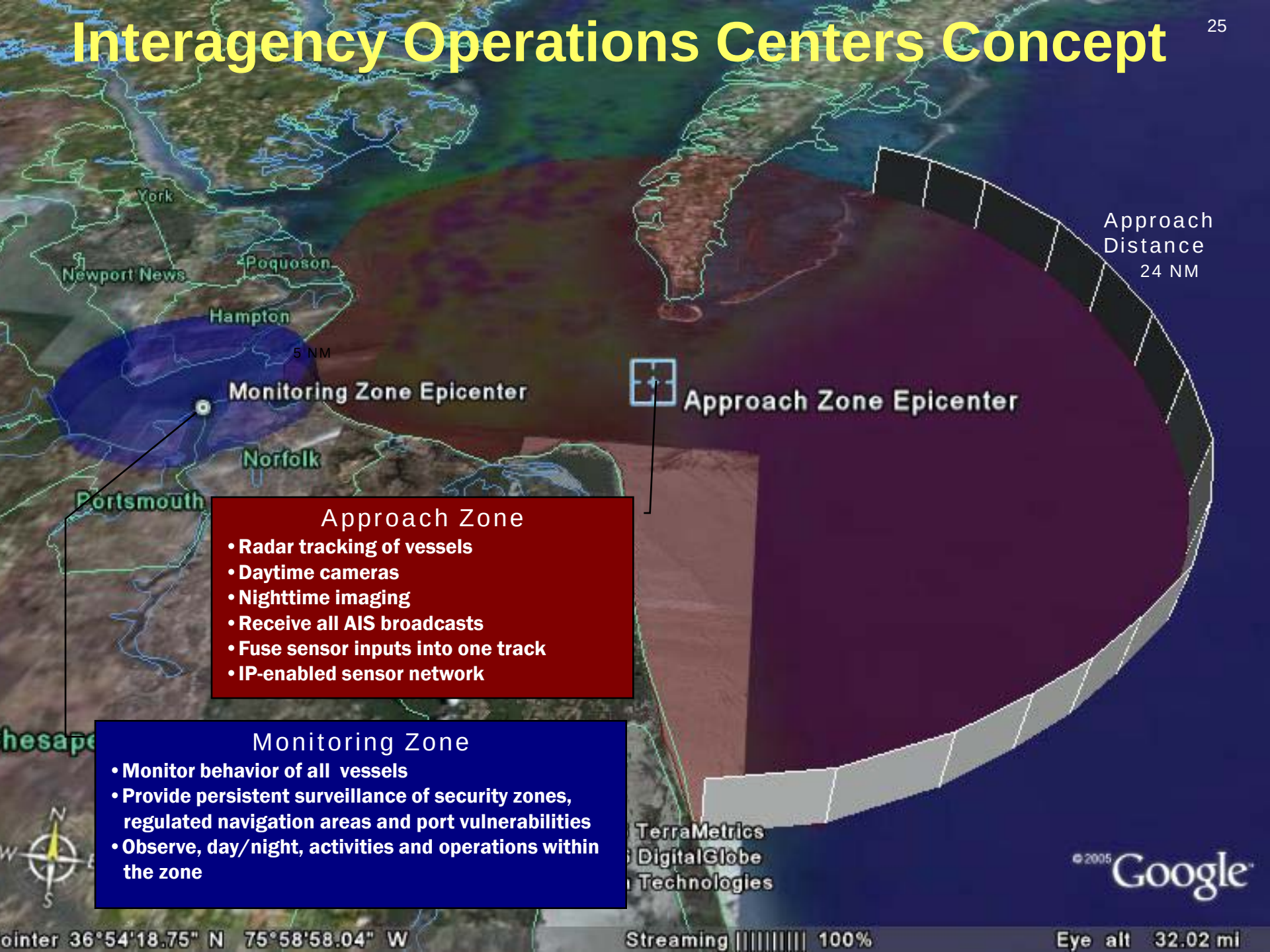
Interoperability

Port Partners

Military

USCG

Interagency Operations Centers Concept



Approach Zone

- Radar tracking of vessels
- Daytime cameras
- Nighttime imaging
- Receive all AIS broadcasts
- Fuse sensor inputs into one track
- IP-enabled sensor network

Monitoring Zone

- Monitor behavior of all vessels
- Provide persistent surveillance of security zones, regulated navigation areas and port vulnerabilities
- Observe, day/night, activities and operations within the zone

In Conclusion

- **The US Coast Guard is one of many agencies in a layered approach to MDA**
- **A variety of sensors, analysis tools, technologies, & partnerships combine to guard our waters**
- **Global implementation & continued international partnerships are essential**
- **MDA is the key to effectively implementing any maritime security strategy**

Thank You

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