Federal Aviation Administration

ICAO Asia-Pacific Regulator's Workshop

ADS-B Workshop – SP/18

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ICAO Asia-Pacific Regulators

- Comparative Requirements to Other ANSP
- Rule Requirements Breakdown
- Overview of AC 90-ADSB - Operational Guidance
- FAA Training
- Next Steps for ADS-B In

Comparative Requirements to Other ANSP

- **Australia (DO-260)**
  - En route 5nm (NRA, FUSION)
- **Canada (DO-260, AMC 20-24)**
  - En route 5nm (NRA)
- **USA (DO-260B)** (FUSION)
  - En route 5nm
  - Terminal 3nm, 4300’ independent parallel app

Breakdown the US Rule Requirements

ADS-B Performance-based Airspace Rule

ADS-B Airspace Requirements

- Where does the rule apply?
- Defined in 14 CFR § 91.225

ADS-B Performance Requirements

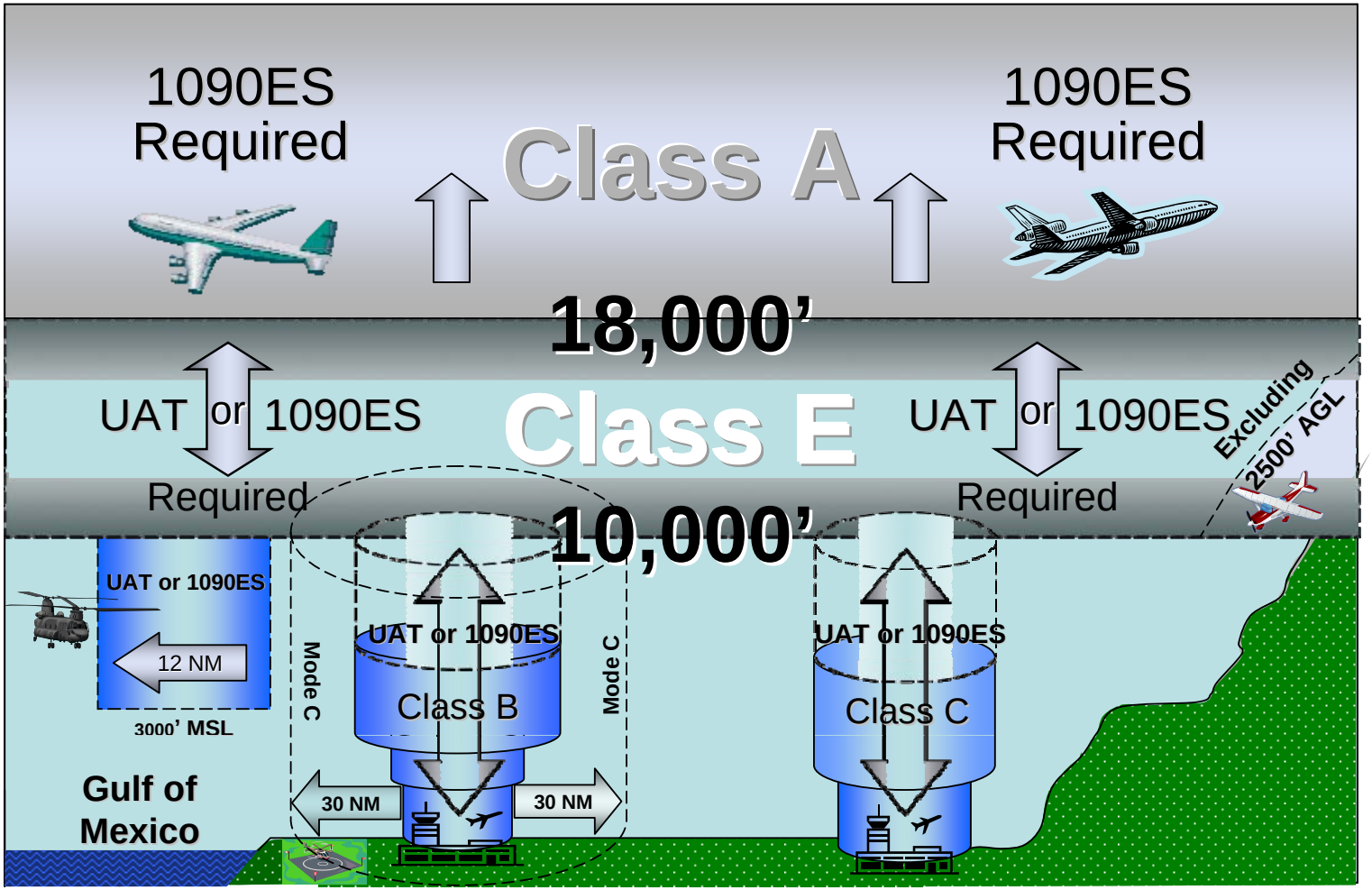
- Accuracy, Integrity, and message elements
- Defined in 14 CFR § 91.227

MANDATE Effective January 1, 2020

ADS-B Rule Airspace Requirements
14 CFR § 91.225

- **Class A, B, & C airspace**
- **Within 30NM of airports listed in 14CFR part 91, Appendix D**
  - The 40 Busiest Airports, Surface to 10,000’
- **Class E airspace above 10,000’ MSL**
  - Exception below 2,500’ AGL (mountainous)
- **Gulf of Mexico**
  - Beyond the US shoreline to 12NM above 3,000’ MSL

ADS-B Designated Airspace



ADS-B Rule Performance Requirements 14 CFR § 91.227

Defines requirement for:

- Navigation accuracy for position and velocity (NACp, NACv)
- Navigation integrity (NIC)
- Latency
- Other required downlink message elements

Class A airspace requires 1090ES

All other ADS-B designated airspace;

- UAT or 1090ES is a choice

Performance Requirements 14CFR §91.227

Equipment Standards

- 1090ES
  - TSO-C166b Class A1, A1S, A2, A3, B1S, or B1
- UAT
  - TSO-C154c Class A1H, A1S, A2, A3, B1S, or B1

Accuracy & Integrity Performance

- $NAC_P \geq 0.05nm$, 95%, NIC ≥ 0.2nm, NAC_V <10ms
- Surveillance Integrity Level (SIL) ≥ 3
- System Design Assurance (SDA) ≥ 2

Performance Requirements 14CFR §91.227

Broadcast Message Elements

- NIC
- NAC_P
- NAC_V
- SDA
- SIL
- IDENT
- Baro Altitude
- Mode 3/A Code
- 24-bit Address
- TCAS Status
- Lat/Long
- Length/Width
- Velocity
- Flight ID
- Geometric Altitude
- ADS-B In Capability
- Emitter Category

Latency

- Uncompensated Latency ≤ 2.0 seconds
- Compensated Latency ≤ 0.6 seconds

Avionics Compliance Monitoring

- **System designed to monitor all ADS-B transmissions (vehicle, aircraft)**
- **Monitor ADS-B message; 14 CFR §91.227**
- **Monitors compliance to 14CFR §91.225**
  - NIC, NAC, SIL, SDA meet requirements for airspace
  - Safety case for separation standards
- **System will generate exception reports for compliance and enforcement action**

AC 90-ADSB, ADS-B Operations

Operations using ADS-B Out for ATC services

Provides information and guidance on:

- **ADS-B system description**
- **Operational considerations by class of airspace**
- **Operations approval for ADS-B Out**
- **General operating procedures**
  - Flight planning, pre-flight, flight ID entry, emergency code entry, ATC Ident, etc
- **Appendices cover additional operational approvals**
  - Canadian Airspace, In-Trail Procedures (ITP)

AC 90-ADSB Operational Considerations

14 CFR § 91.225(d) Airspace considerations:

- 1090ES required in Class A airspace
- UAT or 1090ES in all other airspace

Exceptions:

- §91.225(e) for aircraft not originally certified with electrical system (balloons, gliders, etc)

AC 90-ADSB Out General Operating Procedures

Should provide guidance on:

- Aircrew familiarity with installed system
- How to disable ADS-B transmissions
- Understanding indications of a system failure
- Transmit/Airspace requirements

AC 90-ADSB Out General Operating Procedures

Provides guidance on:

- **ATC authorized deviations**
- **Flight planning**
- **Preflight**
- **Flight information entry**
  - Transponder code
  - Flight ID, aircraft call sign
  - Emergency code entry
  - Ident function

AC 90-ADSB Out General Operating Procedures

Service Availability Prediction Tool (SAPT)

- Similar to RAIM prediction tool
- Predicts areas where GPS availability will not support the required performance levels
- Based on type of GPS equipment
- Route-based predictions, +/- hour
- Web-based for General Aviation
- Batch processing for Airline/Dispatcher use

AC 90-ADSB Out Operational Approval Guidance

- **Chapter 7 contains operations approval requirements for all certificated operators**
- **Part 91 (excluding 91K) operators do not require operations approval for ADS-B Out**
- **All other operators will require operations approval, (OpSpec/MSpec/LOA)**

AC 90-ADSB Out Operational Approval Guidance

Aircraft eligibility

- **Equipment configuration list**

- **Airworthiness documents**
  - Avionics must meet §91.227 requirements (TSO-C166b or TSO-C154c)
  - Flight manual (AFM, RFM, POH) statement
  - Data verifying proper operation of each installed system (return-to-service test)

AC 90-ADSB Out Operational Approval Guidance

- **Training documentation**
  - Includes guidance on topics that should be addressed in operator's ADS-B training:
    - System description, Operation, Limitations;
    - Maintenance, Inspection, MEL;
    - Flight planning;
    - Contingency procedures;
    - Phraseology, etc…

AC 90-ADSB Out Operational Approval Guidance

Operations manuals and checklists:

- Must address standard operating procedures listed in Chapter 8 of the Advisory Circular
- Submit as part of application package

AC 90-ADSB Out Operational Approval Guidance

Maintenance Considerations:

- System installation compliance data (STC, TC)
- MEL changes
  - Data dependencies (GPS, altimetry source)
  - System configuration (GPS, transponder, altitude encoders, MMR, etc)

AC 90-ADSB Out Operational Approval Guidance

Instructions for Continued Airworthiness (ICA)

- **Must follow manufacturer's ICA**
- **ICA must be incorporated into operator's maintenance program**
- **Transponder tests per §91.413 still required**

AC 90-ADSB Out Operational Approval Guidance

Part 129 considerations

- **State Authority Operational/Airworthiness review and approval indicating compliance:**
  - AFM provisions
  - 1090ES Maintenance/ICA
  - MEL approval
  - Aircrew Training
  - Dispatch Considerations

Inspector Training

Internal FAA training:

- **Intro to ADS-B; overview of technology and SBS program**
- **Live satellite broadcast to 129 field offices, over 800 participants**
- **NextGen Technologies course under development**
  - Provide field inspectors with in-depth knowledge of ADS-B technology, equipment/operations approvals
  - Scheduled release in early 2011

ADS-B In; The Next Step

- **Aviation Rulemaking Committee**
  - Established June 2010
  - Chartered for 2 years
  - Provide recommendations to FAA on which applications to invest for maximum benefit to the NAS
  - Initial Report due October 2010
  - Recommendations June 2011

END

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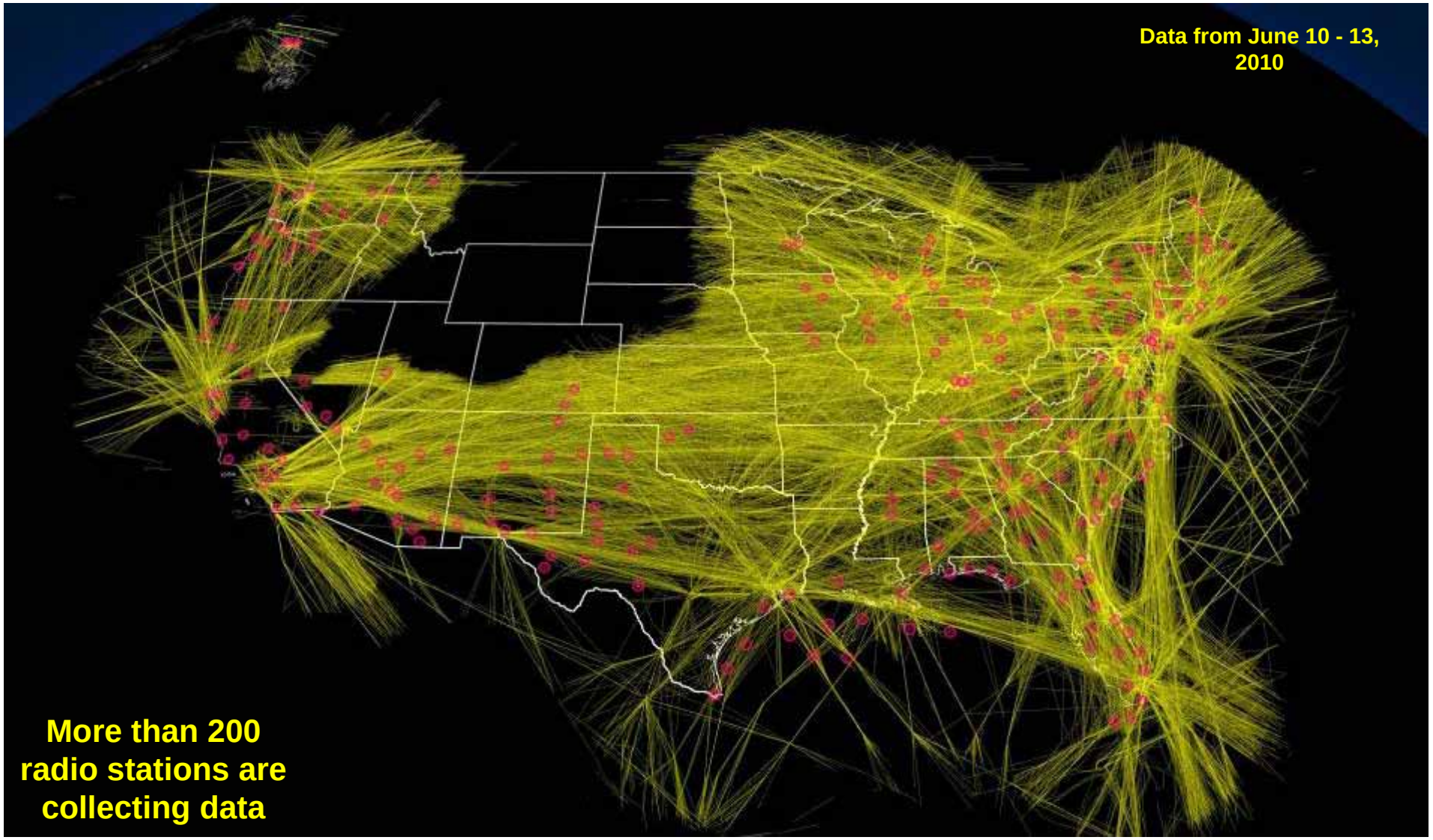
Backup Slides

Coverage from Radio Stations



ADS-B: Nationwide Deployment with Extension to Some Non-Radar Areas

Nationwide build-out of ADS-B Ground Stations on track 2013 completion