ATM Situational Awareness

ADS-B Operational Concept

Victor Hernandez
RO ATM/SAR
Overview

- Global traffic growth
- Global provisions
- Regional strategy for ATM situational awareness
- ATM requirements
- ADS-B Operational Concept
• Global ATM Operational Concept (Doc 9854)
• Global Planning (Doc 9750)
• Regional Planning (Doc 8733) RPB-ANIP
• National Planning
The ATM System needs to be disaggregated to understand the sometimes complex interrelationship between its components and common elements.

The ATM System cannot, however, function without all of its components and common elements being present. The components and common elements must be reintegrated.

ATM Automation

- GREPECAS CONCLUSION 12/31:
  - REGIONAL STRATEGY FOR THE INTEGRATION OF ATM AUTOMATED SYSTEMS
### Regional strategy

<table>
<thead>
<tr>
<th>PHASE</th>
<th>Capabilities</th>
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</thead>
<tbody>
<tr>
<td>Phase I</td>
<td>- Flight data processing System (FDPS) CPL, FLP, RPL</td>
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<tr>
<td>Phase II</td>
<td>- ATS Radar Data Processing System /RDPS; monoradar; multiradar; Radar data sharing.</td>
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<td>Phase III</td>
<td>- Digital automated communications (Automated traffic hand off, AIDC/ CPDLC, etc).</td>
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<td>Phase IV</td>
<td>- CDM implementation for AOM [Airspace Organization and Management], CM [conflict management], DCB [Demand/Capacity Balancing], AO [Aerodrome Operation], TS [Traffic Synchronization], AUO [Airspace User Operation], ASDM [ATM Service Demand Management], AIS, MET, Statistics, etc.</td>
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Annex 11 - Doc 4444

- Radar (PSR, SSR)
- ADS–B
- CPDLC
- Multilateration
<table>
<thead>
<tr>
<th>Data element</th>
<th>Performance characteristics</th>
<th>SSR</th>
<th>ADS-B</th>
<th>MLAT</th>
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ATM requirements

- **a) Conception.** Response to necessities and expectations framework.
- **b) Specification.** Specify operational requirements
- **c) Design.** Operational service; system interoperability.
- **d) Selection.** Services and technologies for implementation.
- **e) Planning.** Services, installations and capabilities
- **f) Operation.** Operational implementation.
Implementation process (Cir 326)

- a) Definition of an airspace concept;
- b) Identification of ADS-B or MLAT performance requirements;
- c) Safety assessment (initial, implementation and operational); and
- d) Preparation for implementation.
Definition of Airspace Concept

Change in SURVEILLANCE as the basis for changing the airspace concept, i.e. change from procedural to ADS-B

Consider: ATS route placement and spacing, separation, obstacle clearance, sequencing, merging, etc.

SUR (ADS-B) Process

Comm

Navigation

ATC tools

Procedures: PANS-ATM, PANS-OPS, Flight crew

Complete safety assessment: See Process C

Implementation planning: See Process D
Select national/regional reference MSSR and compare performance characteristics with reference MSSR used by SASP — Appendices A and B*.

Scenario A

National/regional MSSR has performance characteristics that are the same or lower than the reference MSSR used by SASP.

Use ADS-B performance characteristics derived by SASP — Appendix C* or increase as a consequence of safety requirements.

Define airspace concept: Process B

Complete safety assessment: See Process C

Implementation planning: See Process D

Scenario B

National/regional reference MSSR has higher performance characteristics than SASP reference MSSR.

Derive performance requirements for national/regional ADS-B. Ensure regional agreement. Performance requirements may not be lower than those set by the SASP (they may be the same, if trade-off makes this possible). Ensure safety requirements are satisfied, as appropriate.

Define airspace concept: Process B

Complete safety assessment: See Process C

Implementation planning: See Process D
### Identification of ADS-B Performance Requirements

**Scenario A**

National/regional MSSR has performance characteristics that are the same or lower than the reference MSSR used by SASP.

- Use ADS-B performance characteristics derived by SASP — Appendix C or increase as a consequence of safety requirements.
- Complete safety assessment: See Process C
- Implementation planning: See Process D

**Scenario B**

National/regional reference MSSR has higher performance characteristics than SASP reference MSSR.

- Derive performance requirements for national/regional ADS-B. Ensure regional agreement. Performance requirements may not be lower than those set by the SASP (they may be the same, if trade-off makes this possible). Ensure safety requirements are satisfied, as appropriate.
- Complete safety assessment: See Process C
- Implementation planning: See Process D

**Process A**

Airspace concept from Process

Select national/regional reference MSSR and compare performance characteristics with reference MSSR used by SASP — Appendices A and B*
Based on trajectories

- Airspace redesign and Management
- Airspace capacity
- Aircraft Separation (Doc 4444)
- ATS communication
- ATC emerging techniques and procedures (Training)
Airspace Organization and Management (AOM)

Managed Airspace
Trajectory Managed User Preferred Routing Environment
Separator: ANSP (may be delegated)

High Density Area (defined in space and time)
Route structures deployed for capacity reasons
Separator: ANSP (may be delegated)

Unmanaged Airspace
Separator - Airspace User

Dynamic and variable airspace reservations
PBN Airspace Redesign
ATM situational awareness

- ATS provision to air operations
- Ensure flight plan data / tracks according to user requirements
- Priority of global/regional ATS provision (individual)
- Coordination of flight plans / tracking through collaborative decision making (CDM) with all stakeholders
Enhance ATS & Aerodrome capacity

- Improve aerodrome capacity – GATE-TO-GATE:
  - Required infrastructure - long term
  - Realistic schedule
  - Demand and Capacity Balancing (DCB)

- Minimize impact of adverse weather

- Aerodrome network
“Gate to Gate”

Push back, Taxi, Take Off, Climb, Enroute, Descent, Taxi
• AMAN / D-AMAN
• ATC management to all departures and arrivals
• know position and movement of all vehicles and aircraft operations
• Reduce runway occupancy time (ROT)
• safe operations in all weather conditions