International Civil Aviation Organization
Fifteenth Meeting on the Improvement of Air Traffic Services over the South Atlantic (SAT/ 15)

(Lisbon, Portugal, 19-21 May 2010)

Agenda Item 2 : Air traffic management (ATM)

1.2. Follow up of the AORRA airspace implementation

(Presented by ASECNA)

Summary
The present working paper analyzes some aspects of the implementation AORRA free route airspace that needs to be properly addressed prior to the implementation.
References: • SAT/14 Meeting Report • SP AFI RAN 2008 Report • SAT14TF1Meeting Report

1. Introduction:

1.1 During the SAT14 TF/1 meeting in Sal (Cabo Verde) the following conclusion have been adopted: Conclusion SAT14TF1/05 Implementation of AORRA Phases 3 and 4. That:

1.2 Recognizing the significant benefits expected from the implementation of AORRA and accepting that the ARMA is at present developing the RVSM POSC which is considering current airspace configuration, the result of the POSC will be distributed to States concerned with AORRA for their review when conducting their own safety assessment as stipulated by the ICAO SMS. States concerned with the implementation of phase 3 and 4 complete implementation no later than end April 2010.

2. Discussion:

2.1 The overriding aim of Free Route Airspace is to remove the constraints imposed by the fixed route structure and through the optimised use of all the airspace obtain benefits of capacity, flexibility, flight efficiency and cost savings, while maintaining safety standards.

2.2 Air Traffic Controllers need to adapt to new working methods and new procedures.

2.3 System support need enhancements in the areas of FPPS (Flight Plan Processing **System**) and FDPS (**Flight Data Processing System**). Additional system supports in providing controller tools are necessary to fully exploit the advantages of Free Route Airspace. In a complex airspace, enhanced MTCD (Medium Term Conflict Detection) tools are prerequisite.

2.4 From the experience gained from phase 2 implementation in ASECNA airspaces, we can deduce that:

- Flight planning procedures are needed which are understandable and easy to use and are coherent with procedures for the fixed route network.
- AORRA detailed ATC Operational Procedures developed during implementation phase includes:
  - Flight Planning Procedures
  - Contingency Procedures
  - Fixed Route - Free Route Transition Procedures
  - Data presentation
  - Inter/intra centre Co-ordination
  - Route Deviation
  - Data inter change facilities (AIDC or OLDI)

Requirements for ATC Units

Need For System Support

The need and the level of system support required by Controllers for implementation of AORRA depend on the density and expected growth of air traffic in SAT region. In low-density traffic areas it is expected that the current level of system support available to Controllers will be sufficient. In medium to high-density areas far higher levels of system support will be necessary.

Flight Data Processing (FDP)

FDP systems is capable of processing data across the correct sector sequence for aircraft flying on a free route with only the knowledge of AORRA entry/exit points and any intermediate user defined waypoints. FDP systems will be capable of recognising the complete environment e.g waypoints and airspace boundaries.

Trajectory Prediction

The Trajectory Prediction function supports requirements derived from necessary system support for co-ordination, monitoring, conflict detection and resolution, together with display requirements.

Co-ordination

The automatic exchange of flight data between ACC's and between sectors requires that that systems are capable of identifying and transferring data at random points along an ACC or sector boundary, unlike where co-ordination is mainly affected by using fixed co-ordination points.

Monitoring Aids

It supports the Controller in the task of monitoring that an aircraft is conforming to its free route as well as triggering updates of the system trajectory for use in conflict detection. When a deviation is detected it either automatically triggers the trajectory re-calculation process, thus providing an accurate trajectory for Medium Term Conflict Detection (MTCD), or warns the Controller of a deviation from the trajectory. In AORRA operations, in order to enhance Controller situational awareness, Monitoring Aids can provide reminders to Controllers concerning planned actions.

Conflict Detection and Resolution Tools
With the absence of a fixed route network conflicts are likely to be more random in nature, different in characteristic and less predictable which could result in problems of detection for the Controller. The use of Conflict Detection and Resolution tools is expected to provide significant support to Controllers in the execution of these tasks. The efficiency of these tools, for example MTCD, is highly dependent on the availability of an accurate system trajectory for a given flight.

Human Machine Interface
Other than at FIR boundary ACCs entry/exit will be via random co-ordination points. The assimilation of an aircraft's route across a sector may be difficult for Controllers to visualise. The HMI provided at the Controller Working Positions is sufficient to support the display of the free route and subsequent updates.

Human Performance: Impact on Air Traffic Controllers
The overall impact on Controllers will be dependent on the level of traffic density in which he or she is working. In low-density areas the impact may be small whereas in high-density areas the impact may be significant. The removal of the route network as a main means of assimilating the overall picture will undoubtedly affect the controllers' working methods. Today, a controller has the basic pattern of the route network to act as an aid to traffic management. Within AORRA this network does not exist.
Potential conflicts, instead of occurring at known points, are widely dispersed among numerous random points.
The recovery from non-nominal situations is not expected to introduce increased difficulty for controllers

Conflict Detection and Resolution
The tasks of monitoring and conflict detection increase while the actual number of conflicts should decrease. The controller will not easily recognise if a flight is deviating from its planned route and will have to continuously "look ahead" for each individual flight to find a potential conflict.
Potential conflicts should be displayed to the Controller in a timely manner to enable early resolution.

The Planning Controller
The task of the Planning Controller does not change. However, the way in which the task is performed well change. The move away from the route network removes the structure around which the planning controller manages the entry/exit of traffic to solve potential conflicts in the medium term.

The Executive Controller
The task of the executive controller in solving short-term problems is unlikely to change. However, the way in which the task is performed may well change. Increased airspace capacity need to be matched with increased controller capability if the extra throughput of aircraft is to be handled efficiently.

Implications
The immediate implications are:

- The ability of controllers to adapt to new working methods.
- Provision of controller tools where necessary and associated time-scale
- Training needs prior to implementation and for new controllers.

3. Conclusion:

Today, with the full implementation of ADS-C/CPDLC in Dakar and Abidjan ACCs, ASECNA call for an effective interoperability of SAT States systems and cooperation to implement data and applications exchange to improve operational coordination and air navigation safety as per the SAT FIT 4 Conclusion SAT FIT 4/8.

There is a need of follow up action under the aegis of ICAO analysing the situation of each ACC to assure that interoperability is affective with the neighbouring ACC to support AIDC or OLDI so that to mitigate the effect of lack of flight plan and/or coordination.

4. Action by the meeting:

The meeting is invited to:

- Note the information provided in the present Working Paper;
- Review the proposal of action plan here above in view to overcome the issue of interoperability and coordination.
- Make sure when implementing AORRA phases 3 and 4 airspace and removing ATS routes that all the requirements between adjacent ACCs have been properly addressed.