



INTERNATIONAL CIVIL AVIATION ORGANIZATION

AFI Planning and Implementation Regional Group (APIRG)
Thirteenth Meeting

(Sal, Cape Verde, 25- 29 June 2001)

Agenda Item 4.5 : Planning and implementation of CNS/ATM systems

(Presented by Senegal)

SUMMARY

This paper is a report on the various activities undertaken by ASECNA within the framework of the transition to the new ICAO CNS/ATM systems and namely, the implementation of an automated flight data processing system, fitted with CNS/ATM functionalities (ADS/CPDLC) in Dakar Centre which manages the 2 Dakar Oceanic and Terrestrial FIRs.

1. INTRODUCTION

The implementation of a data processing system and flight data visualization with ADS and CPDLC in Dakar is the continuation of efforts made by ASECNA for the automation of its flight centres at Madagascar. It confirms the results of five years of studies and experimentation conducted in the field of automation and on ADS at ASECNA. The operational processing of this system will enhance the quality of the service provided to users as well working comfort for controllers.

2. SADATO PROJECT SCHEDULE

To make available an operational system by the second quarter of 2003 is the objective.



3. SADATO – ADS Dakar Terrestrial and Oceanic System

The system will be designed and operated to take into account the following projects :

- Centres automation (ATM02)
- Airspace rationalization
- Control extension
- Mirroring implementation
- New technologies in the field of CNS/ATM systems.

3.1. Visualisation System

The SADATO system should use the aircraft tracing methods in the 2 FIRs Dakar Terrestrial and Dakar Oceanic :

- Flight data processing (FDPS)
- Automatic Dependent Surveillance
- CPDLC (Controller-Pilot Datalink Communication)

It should have the ability to process SSR or PSR echoes

Flight plan Data Processing System – FDSP

The flight plan data processing system, the heart of the SADATO system should provide a simple and efficient means to manage flight plan data received through the AFTN (manual entries – AFIL or BDP) or data automatically extracted from a data base (Repetitive Flight Plan).

From this flight plan data, the system provides a Flight Plan Air Situation Display – FPASD). This functionality makes possible a graphical representation of a non- FANS1/A equipped flight.

Controllers must have a visualization of the air situation (pseudo-radar image) displaying all the traffic they are responsible for as well as traffic close to their FIR.

The system should also make possible data exchanges between ATS calculators according to OLDI protocol, with a view to simplifying interfaces and coordination with adjacent centres such as Cape Verde and Dakar.

ADS Functionalities

If ADS is the exchange between calculators on board and on the ground, SADATO also enables exchanges between humans (controller/pilot) through data link communications (CPDLC).

The SADATO system should use automatically information from CPDLC messages in order to update the corresponding flight plan (route and estimated time on points of that route, electronic strip, runway).

Early warning facilities

The SADATO facility should provide a number of warning systems to controllers. Such systems will be the outcome of specific processing integrating data from various sources : FDPS, ADS, CPDLC, AFTN and conveyed to the controllers through a change of colour, a warning text or an aural warning.

DARPS and Flexible Route Display

The system should make it possible to visualize flexible routes, calculated from meteorological data during their validity time, on the area covered by the systems.

3.2. Other functionalities

Recording System and Re-display

SADATO should make possible, on one hand, the recording of all messages issued and received by the system and any controller's action and, on the other hand, the re-display of such messages on a dedicated position.

Oversight

SADATO will be fitted with operational and technical oversight facilities informing the operators and maintenance officers of the state of hardware and software components of the system with control devices for the purpose of stopping or starting them. It also makes possible the grouping / degrouping operational positions.

Simulator

Specifications provide for the implementation of an independent simulator made of 2 trainee positions identical to that of the operational segment and 2 instructor positions, which allow the establishment of data

links (AFN), for the ADS, the exchanges of CPDLC messages, and sending AFTN messages. This simulator must also have the capacity of managing the traffic of another FIR (e.g ; Niamey) in the event that the centre which is managing that FIR was not available (mirroring function).

3.3. *Material configuration*

Controller Interface

The ACC/FIC room will be fitted with 4 control positions (DKR Territorial West, DKR Territorial East, DKR Oceanic and FIC and one post for room supervisor).

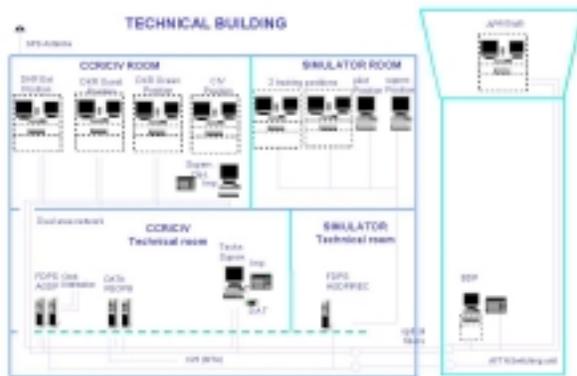
The system-controller interface comprises, on each position, one 2K x 2K color screen, one for visualization of the air situation and one 1K x 1K screen for flight data display, ADS/CPDLC data display, one keyboard and mouse for the two visualization screens and one strip printer.

Simulator

It will be fitted with 2 control positions with 2K x 2K color screen (exécutive) et 1k x 1k (organic).

3.4. *Installation in Dakar*

The system will be installed in the renovated technical building and in the new control tower at the Dakar-Yoff airport in accordance with the following diagram :



3.5. *SADATO System Benefits*

Technical benefits

The following are the main technical benefits of SADATO System :

- Unequivocal communications without any geographical limitation : any ground application could reach any aircraft fitted with adequate equipment and vice versa, even beyond radar and radio limits.
- Air / ground integration : aircraft are actively involved in the system. Consequently, instead of having a system trying to guess the aircraft's intention, ground and airborne applications exchange and process data necessary for their respective information requirements.

Operational benefits

ADS and CPDLC, new CNS/ATM means make available functionalities to air traffic services which, coupled with a system for processing and visualization of flight data, make possible :

- The enhancement of safety,
- The automation of a number of tasks for the controller and the improvement of working tools,
- The visualization of the aircraft position and the progression of the air traffic by the controller,
- The improvement of information processing and transfer between operators, aircraft and ATS units,
- The extension of air traffic surveillance
- Immediate detection of errors in inserting routing points and other gross errors.
- Adherence to preferred flight profile in all flight phases based on the operator's objectives.
- Improvement of the detection and conflict resolution and quick adjustment to changing air traffic conditions.

4. Conclusions

- A new technical solution for surveillance (being standardized).
- In oceanic and continental areas such as ASECNA FIRs where speech position reports are the only available means of surveillance and where the HF band is congested, ADS should impose its usefulness and mostly improve significantly safety and regularity of flights as soon as it is implemented.
- ASECNA projects have integrated combined surveillance (SSR, ADS, FPASD) which makes possible the display of SSR or PSR echoes, ADS and flight plan.

5. Action by the meeting

The meeting is invited to :

- Note the information supplied in this document,
- Recommend to users, notably international airlines operation on certain AFI routes and duly equipped to take part in the operational implementation of the FDPS/ADS/CPDCL in the AFI Region.
- Recommend to users filing flight plans and staff issuing and recording ATS messages, namely flight plans, to comply with recommendations in ICAO PANS/RAC 4444 on the subject matter.

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