International Civil Aviation Organization

AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP
SIXTEENTH MEETING (APIRG/16)
(Kigali, Rwanda 19-23 November 2007)

Agenda Item 4: AFI Regional Air Navigation Planning and Implementation Issues

4.2: Communication, Navigation, Surveillance

STRATEGY IN THE IMPLEMENTATION OF COMMUNICATIONS, NAVIGATION AND SURVEILLANCE IN ASECNA

(PRESENTED BY ASECNA)

SUMMARY

This working paper presents the strategy in the implementation of Communications, Navigation and Surveillance in ASECNA area with regard to the technological evolution, the results of the specialized technical working groups on the issue of CNS and based on its own experience and other experiences from some ICAO regions.
It calls the AFI region to a common effort in improving communications means required for a beneficial implementation of the CNS.

1. Introduction

The CNS systems concept, which has received the endorsement of ICAO Member States, is now in its implementation phase. This major task includes the development of standards, recommended practices and guidance material through various specialized working groups. Today experimentations are being conducted regarding the implementation of CNS systems in the different ICAO regions.

Early, ASECNA has been involved in the experimentation and the implementation of new CNS / ATM systems in cooperation with several partners in order to take advantage of these systems to improve the safety of the Air Navigation service provided to the users.

The AFI region adopted an initial transition plan to CNS/ATM and the guidance materials which require regular updating to take in account the new developments and experiences in CNS field.

2. Discussion

The Airspaces managed by ASECNA include a major oceanic and desert part and the air/ground communications to support the Air Navigation Service and to meet the ICAO **Required Communications Performance have to match with this kind of constraints.**

On the basis of regional and inter regional role assigned to some FIRs and centres of ASECNA, t**he ground to ground communications issue is followed in coordination with others involved Air Navigation Service Providers**

2.1 Communications

2.1.1 The ATN implementation strategy

The ATN has been defined as an inter-network architecture that allows for the operation of the ground, air-ground and avionics data sub-network through the adoption of common interface and protocol services based on the International Standardization Organization (ISO)open system inter-connection (OSI)reference model.

The implementation of ATN will require to have reliable sub-networks, well interconnected and interoperable. So efforts must be purchased in the upgrading and the interoperability of the AFI sub-networks as emphasized by several AFI meetings.

In this respect ASECNA created a technical working group to conduct studies on the evaluation and the improvement of the AFISNET in its area and the final conclusions could be shared with the other members of AFISNET at the end of the study.

The strategy of implementing ATN based on the OSI model had been at first considered for long, now the strategy of implementing TCP/IP in the ground to ground network is widely shared, this leads to the necessity of implementing dual-stack ATN end-systems (TP4/CLNP and TCP/IP), which need to be implemented at inter-regional boundary gateways to other ICAO regions and at intra-regional gateways to air-ground ATN routers for possible relay of messages from the ground-ground network to the air-sub networks or routers.

In order to go a head in the implementation of the ATN in the AFI region, a specialized working group could create to study the strategy to implement ATN/OSI and/or ATN/IP.

2.1.1 Communications Applications implementation strategy

Ground/Ground communications

The major ATN applications defined by ICAO as ground to ground (G/G) applications are:

- o Aeronautical Message Handling Service (AMHS).
- o ATS Inter-facility Data Communications (AIDC).

Based on the existing architecture and in the meantime to achieve the global performance required for the ATN implementation, improvement of communications services could be implemented gradually.

Dakar, Niamey and Brazzaville are AFI AFTN main centres equipped with AMS systems. These centres will be upgraded in the framework of the current investment plan (2007-2008) and the systems to be implemented will have ATS Messages Handling Service (AMHS) capability. So full AMHS links will be implemented in test phase in parallel with the main AFTN circuit in ASECNA area and with the others equipped main Centres (Algiers, Casablanca…)

Ndjamena, Dakar, Niamey, Abidjan a and Antananarivo sites are already equipped with FDPS (EUROCAT-X) and with the AIDC capability and ASECNA plans to implement the AIDC links between this centres and also with Sal, Algiers, Casablanca in a cooperative approach.

Air/ground communications

In the various studies and experimentations it appears that in the future, the use of data link transmissions will increase to the detriment of the voice communications. However, the migration to a full compliant ATN /VDL could take some time due to the cost of the fleet retrofit and the full replacement VHF analogue radio available today and not compatible with the upcoming new technology. The VHF Data Link (VDL) operation requires VHF Digital Radio (VDR).

At the moment and in the meantime the fleet is enough equipped with the VDL ASECNA decided to use the data link over ACARS to support the FANS1/A applications (CPDLC, ADS…). ASECNA and SITA signed an agreement for the use of AIRCOM system The cost of the ACARS lines for the AFI region is relatively expensive and it is necessary to have a global approach by the ANSP.

ASECNA is in negotiation with SITA to implement a more cost effective architecture.

According to the VDL capability of some fleet ASECNA will introduce gradually a VDL mode 2 network by upgrading or change the existing VHF equipments to support the VDL-2 capability.

However, ASECNA will continue to improve the extended VHF coverage by implementing new VHF stations in order reinforce the existing VHF coverage to get a double coverage.

2.2 Navigation

The implementation of a new system requires acquiring experience and confidence before authorizing its operation. It is also necessary to know its characteristics to be able to define the procedures of ratification, operation and maintenance.
ASECNA in cooperation with international partners (ESA, DGAC…) has experiments including operational tests which gave very satisfactory results and allowed of acquire competence in GNSS domain (SBAS).

Technically, benefice could be got from the GNSS implementation for the AFI region but the institutional, economic and financial aspects and the fleet equipment are not yet well defined. ASECNA GNSS strategy is pending the regional position to be decided in a global AFI GNSS strategy by the states for ANSP.

2.3 Surveillance

Surveillance is the eye of the ATC which provide the controller with the information necessary to insure

ASECNA adopted a surveillance plan based on:

- the implementation of secondary monopulse surveillance Radar augmented with S mode in Ndjamena, Dakar, Niamey, Abidjan
- ADS-C coverage in the oceanic and desert areas to complete the radar coverage
- ADS-B or Multilateration systems in the others parts of the FIRs based.

An ADS-B experimentation in Dakar conducted in cooperation with (DTI-France) showed that ATC could take advantage of this system with regard to the architecture of VSAT communications network used to support the extended VHF coverage in ASECNA area.

For the efficiency, the airlines must be enough equipped and a regional strategy must be considered in this way.

3. Conclusion

3.1 The meeting is invited to :

- take note of ASECNA efforts in implementing CNS systems to improve the air navigation safety;
- comment on the regional strategy to implement the new CNS systems and adopt in collaboration with ICAO, a regional strategic position for the implementation of GNSS ;
- recommend the continuation of the efforts to meet the Requirement Communications Performance in terms of capability, availability, traffic delays…
- Encourage regional and inter regional cooperation in experimentation of the new CNS systems ;
- recommend to airlines to equip their aircraft to take advantages of the new systems implemented.