

January 2009

ONGOING EFFORTS FOR CNS/ATM IMPLEMENTATION IN THE MIDDLE EAST & AFRICA

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The following paragraphs are **abstracts** compiled from ICAO documents to reflect the ongoing efforts in implementing FANS CNS/ATM technologies in the Middle East & Africa. **The compiler's comments are highlighted in green and grey.**

Reference used: ICAO – Report of the 3rd meeting of the CNS/ATM Implementation Coordination Sub-Group (CNS/ATM/IC SG/3) – Cairo February 2007.

REPORT ON AGENDA ITEM 7: ADS/CPDLC ACTIVITIES IN THE MID REGION (MID : Middle East)

7.1 ADS-B activities in the MID Region

7.1.1 Under this Agenda Item, the meeting noted with appreciation that Saudi Arabia has developed a plan for an ADS-B Test Bed. The project is planned for trial purpose and the trials are expected to take place in the first quarter of 2009.

7.1.2 An ADS-B Ground Station will be installed in Jeddah, King Abdulaziz International Airport (KAIA) and will be interfaced with the new ATM system in Jeddah ACC. The objective will be to provide ADS-B coverage for the approach area. It is to be noted that only aircraft equipped with ADS-B transmitter/receiver system and/or Mode S extended Squitter, will participate in the trials.

7.1.3 The meeting noted that the ADS-B system will include the following elements:

- ADS-B Ground Station, including site monitor equipment
- Remote Control and Monitor System (RCMS)
- Software Support Facility (SSF)
- Site monitor
- Antennas
- Display workstation.

RECOMMENDATION 1/7 – GROUND AND AIRBORNE AUTOMATIC DEPENDENT SURVEILLANCE BROADCAST (ADS-B) APPLICATIONS FOR GLOBAL INTEROPERABILITY

That ICAO and States:

- a) Recognize ADS-B as an enabler of the global ATM operational concept bringing substantial safety and capacity benefits;*
- b) Support the cost-effective early implementation of packages of ground and airborne ADS-B applications, noting the early achievable benefits from new ATM applications; and*
- c) Ensure that implementation of ADS-B is harmonized, compatible and interoperable with respect to operational procedures, supporting data link and ATM applications.*

7.1.9 The 11th Air Navigation Conference was of the opinion that a significant number of States from several regions might not be in a position to fully support such convergence on a global near-term solution at the present time without further study and consideration. In particular, it was recognized that certain States might not have identified a near term need for introducing ADS-B in their airspace; or might be still in the process of selecting an appropriate ADS-B link technology; or might be conducting regional coordination in the interest of regional harmonization before committing to a technology choice; or might have already identified as their preferred technical solution one that was partly or wholly inconsistent with the implementation of the SSR Mode S extended squitter. In this regard, the meeting recognized that for the near term, other link technologies supporting the initial introduction of ADS-B applications may optionally be used on a local or regional basis either in addition to Mode S extended squitter or in lieu of Mode S extended squitter in support of local or regional operations. (A suggestion for the use of MLAT equipment)

7.1.10 On the basis of the above considerations with regard to potential near term ADS-B solutions, the 11th Air Navigation Conference formulated the following Recommendation:

RECOMMENDATION 7/1 – STRATEGY FOR THE NEAR-TERM INTRODUCTION OF ADS-B

That States,

- a) note that a common element in most of the approaches currently adopted for early implementation of ADS-B is the selection of the SSR Mode S extended squitter as the initial data link; and*
- b) take into account this common element to the extent possible in their national and regional implementation choices in order to facilitate global interoperability for the initial introduction of ADS-B.*

7.1.11 It was also highlighted that MIDANPIRG/9 (MIDANPIRG = Middle East Air Navigation Planning and Implementation Regional Group) when reviewing the outcome of the 11th Air Navigation Conference related to the strategy for near term introduction of ADS-B, encouraged MID States to implement ADS-B taking into account studies carried out in the other ICAO Regions (like Australia in specific).

7.1.12 Reference was made to the Global Plan where ADS-B is considered as an enabler of GPI-9 “SITUATIONAL AWARENESS” (GPI = Global Plan Initiative). In this respect, it is recognized that further implementation of enhanced surveillance techniques (ADS-C or ADS-B) will allow reductions in separation minima and an enhancement of safety, increase in capacity, improved flight efficiency, all on a cost-effective basis. These benefits may be achieved by bringing surveillance to areas where there is no primary or secondary radar, when cost-benefit models warrant it. In airspaces where radar is used, enhanced surveillance can bring further reductions in aircraft separation minima and improve, in high traffic density areas, the quality of surveillance information both on the ground and in the air, thereby increasing safety levels. It was also highlighted that the 1090 extended squitter should be accepted as the global choice for the ADS-B data link.

So ICAO encourages having 1090 ES as the standard data link rather than UAT or even VDL4.

7.1.13 Based on the above, the meeting encouraged States in collaboration with the airspace users to develop and implement an ADS-B trials programme using the available technology and services, aimed at improving the ADS-B knowledge and evaluating the benefits for the Air Traffic Management in the MID Region. Accordingly, the meeting developed the following Draft Conclusion:

DRAFT CONCLUSION 3/6: MID REGION STRATEGY FOR THE IMPLEMENTATION OF ADS-B

That,

- a) *MID States, in collaboration with the airspace users, are encouraged to develop and implement ADS-B trials programme, when cost-benefit models warrant it; and*
- b) *the Strategy at **Appendix 7A** to the report on Agenda Item 7 be endorsed as the MID Region Strategy for the implementation of ADS-B.*

The strategy at Appendix 7A is mentioned hereunder:

MID REGION STRATEGY FOR THE IMPLEMENTATION OF AUTOMATIC DEPENDENT SURVEILLANCE-BROADCAST (ADS-B)

Considering:

- a) the ICAO strategic objectives;
- b) the ICAO Business Plan;
- c) the Global Air Traffic Management Operational Concept;
- d) the revised Global Air Navigation Plan and associated GPIs;
- e) the outcome of the 11th Air Navigation Conference; and

Recognizing that:

- i) the implementation of data-link surveillance technologies is an evolutionary process, but which has significant potential for safety and cost-effectiveness; and
- ii) implementation of ADS-B is in support of various Global Plan Initiatives;

The MID Region strategy for the implementation of ADS-B is detailed below:

A) the MID Region ADS-B implementation plan should:

- 1) be evolutionary and consistent with the Global Air Navigation Plan taking into consideration associated MID Region priorities;
- 2) when cost/benefit models warrant it, prioritize implementation in areas where there is no radar coverage surveillance, followed by areas where implementation would otherwise bring capacity and operational efficiencies;
- 3) ensure that implementation of ADS-B is harmonized, compatible and interoperable with respect to operational procedures, supporting data link and ATM applications;
- 4) identify sub-regional areas where the implementation of ADS-B would result in a positive cost/benefit in the near term, while taking into account overall Regional developments and implementation of ADS-B in adjacent homogeneous ATM areas;
- 5) be implemented following successful trial programmes with regards to safety and operational feasibility, taking into account studies and implementation experiences from other ICAO Regions; and
- 6) be implemented in close collaboration with users.

B) Implementation should be monitored to ensure collaborative development and alignment with the MID Region projects and relevant elements of the GPIs.

In a previous period, FANS-1/A (ADS/CPDLC) was tested in Jeddah KSA. The description, findings and remarks could be useful, so here they are:

7.2 FANS 1/A activities in the MID Region

7.2.1 The meeting noted that FANS 1/A (ADS & CPDLC) trials have been carried out by Saudi Arabia during the period from 4 January to 3 April 2006. The trials were based on the two prototype workstations with FANS-1/A capability, which were installed in the Riyadh Approach Control facility in December 2005.

7.2.2 It was noted that the trials were conducted in two phases:

- Phase I: limited number of aircraft participating from Saudi Airlines only. This phase was a systems familiarization phase limited to 8 hours per day; and
- Phase II: two additional airlines participated in the trials after signing an MOU and the hours of Trial operation was extended to 16 hours per day.

7.2.3 Voice clearances remained the primary means of communications throughout the Trials and data link messages supplemented voice communications.

7.2.4 The meeting noted that the comments received from participating airlines indicated that:

- trials were very successful;
- CPDLC is very useful and Airlines want the service operational;
- FANS services should be applicable to the whole Jeddah FIR;
- timeframe required for Voice reporting was a duplication with CPDLC;
- FANS Procedures must be consistent with other FIRs; and
- the FANS-1/A Operations Procedures Manual needs to include guidance for flight over Continental airspace;
- the potential benefits of the FANS 1/A implementation would be the reduction of the:
 - overflight permission burden; and
 - problems associated with the occurrences of lost ICAO FPLs.

7.2.5 The meeting noted the following lessons learned from the FANS 1/A trials:

- FANS-1/A has potential benefits for Saudi Arabia, and possibly other parts of the region, if implemented;
- the system works very well once air traffic controllers are well trained;
- flight Data is key to making the system work correctly;
- there were no safety concerns identified during the trials;
- the system supports preferred routing but there are airspace issues that need to be addressed as well;
- FANS 1/A implementation has implications beyond Saudi Arabia and this should be studied on a regional basis.

7.2.6 The meeting noted also that a proposal for a larger Regional FANS-1/A trial was made at the SITA/IATA/ACAC/NANSC “*FANS IMPLEMENTATION AND CNS/ATM TECHNOLOGY SEMINAR*” held in Cairo from 2 to 3 May 2006. This has been adopted and an ACAC FANS Implementation Group (AFIG) has been established to, inter-alia, coordinate the trials. The AFIG/1 meeting was held in Jeddah from 19 to 20 September 2006. The meeting noted that the objectives of the trials are to:

- exercise and introduce new CNS/ATM functionalities in a controlled operational environment;
- provide an opportunity for ATC personnel to become familiar with new FANS1/A procedures;

- obtain direct feedback from ATC and crew on the applications and aspects of data link;
- monitor , record and assess accuracy of ADS position information together with the practice associated with CPDLC;
- establish the requirements for a fully integrated operational data link service and to test and shakedown the system “end to end” to establish that the system works correctly; and
- obtain first hand factual data on the operational benefits, requirements, human errors, procedures and any problems with using air-ground data link.

7.2.7 Bahrain confirmed that they will join Saudi Arabia in the FANS 1/A trials. IATA supported also the implementation of FANS 1/A in the region and confirmed that more than 50% of the MID based Airlines’ aircraft are equipped with FANS 1/A as reflected in Appendix 7B to the report on Agenda Item 7.

7.2.8 The meeting noted that many areas in the MID Region are still not covered by radar (around 40%). This includes the Oceanic airspace (Arabian Sea and West of the Indian Ocean), the empty quarter (in Saudi Arabia), parts of Baghdad FIR, Cairo FIR, Damascus FIR and Sana’a FIR. Furthermore, concern was raised about the coordination between States in the MID region mainly for the exchange of radar data and improvement of the VHF communication.

7.2.9 Reference was also made to the Global Plan and especially GPI-17 “DATA LINK APPLICATIONS”. In this respect, it is recognized that the use of CPDLC and implementation of other data link applications can bring significant advantages in terms of workload and safety over voice communication for both pilots and controllers. In particular, they can provide efficient linkages between ground and airborne systems, improved handling and transfer of data, reduced channel congestion, reduced communication errors, interoperable communication media and reduced workload. The reduction of workload per flight translates into capacity increases and enhances safety. It was also highlighted that communication data link and data link surveillance technologies and applications should be selected and harmonized for seamless and interoperable global operations. ADS-C, ADS-B and CPDLC are in service in various regions of the world but lack global harmonization. Current regional initiatives, including utilizing unique message subsets and CPDLC procedures, hinder efficient development and acceptance for global aircraft operations. Existing and emerging technologies should be implemented in a harmonized global manner in the near term to support long-term goals. Harmonization will define global equipage requirements and therefore minimize user investment.

7.2.10 The meeting recognized that FANS-1/A and ATN applications support similar functionality, but with different avionics requirements and that many internationally operated aircraft are initially equipped with FANS-1/A avionics to take advantage of data link services offered in certain oceanic and remote regions. Accordingly, the meeting agreed that any implementation of the FANS 1/A should be supported by a safety case.

7.2.11 Based on the above, and after an extensive discussion, some of the participants were of view that FANS 1/A should be implemented in the region as an interim solution until a fully ATN compliant ADS/CPDLC system is made available. Accordingly, the meeting developed the following Draft Conclusion:

DRAFT CONCLUSION 3/7: FANS 1/A ACTIVITIES IN THE MID REGION

That MID States, in coordination with users, are encouraged to implement FANS 1/A (ADS-C/CPDLC) as an interim solution, until a fully ATN compliant ADS/CPDLC system is made available.

In addition to the ADS-B report, the ICAO is holding several task forces, committees and sub committees, groups and sub-groups, seminars and meetings to discuss subjects like Reduced Vertical Separation Minima (RVSM), Search & Rescue, Civil/Military Coordination, Aerodrome Emergency Planning, Air Traffic Flow Management mainly for Kabul FIR (Afghanistan) and Baghdad FIR, as well as Global Navigation Satellite System (GNSS) and Augmentation systems.

Concerning the GNSS and Augmentation, two systems are being tested:

- NAVISAT for GNSS
- EGNOS for Satellite Based Augmentation System (SBAS)

EGNOS is the European Geostationary Navigation Overlay System, a joint project between EUROCONTROL, the European Commission (EC), and the European Space Agency (ESA).

The following proceedings are from the ICAO Report of the 6th Meeting of the Middle East GNSS Task Force (GNSS TF/6) – Cairo June 2007, which, if compared to the Report of the 7th Meeting of the GNSS Task Force (GNSS TF/7) – Cairo April 2008, does not reveal any significant difference or achievement.

REPORT ON AGENDA ITEM 3: GNSS TRIALS AND DEMONSTRATIONS IN THE MID REGION (abstract from the 6th Meeting - 2007)

3.1 Under this Agenda Item, European Space Agency (ESA) and European GNSS Supervisory Authority (GSA) provided the meeting with an updated status of the study launched by the Galileo Joint Undertaking (GJU) and now entrusted to the GSA with the technical assistance of the ESA for the extension of EGNOS Services over the Middle East. The meeting noted that the study will be running over one year, and it is composed of two main tasks which are the ACAC Regional GNSS (ARG) infrastructure implementation definition and the ARG service implementation definition.

PROPOSED TERMS OF REFERENCE FOR PBN/GNSS TASK FORCE – Appendix 5A (abstract from the 7th Meeting – 2008)

2.l Monitor the progress achieved related to the feasibility study pertaining to the possible use of EGNOS as GNSS augmentation system in the MID Region.

2.m Monitor the progress of the NAVISAT study.

Concerning NAVISAT, it is a CNS satellite-based system for Africa and the Middle East, sponsored by Alcatel Space.

The meeting had the following conclusion.

"The meeting supports the NAVISAT as a part of the CNS/ATM infrastructure in the Middle East & African regions to offer the aeronautical communication and navigation services according to the ICAO recommendations."