

ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

Agenda Item 1: Introduction and assessment of a global air traffic management (ATM) operational concept

1.2 Enabling concepts in support of the global ATM operational concept
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PAKISTAN'S ATM NETWORK AND ITS TRANSITION TO CNS/ATM

(Presented by Pakistan)

1. INTRODUCTION

1.1 Pakistan had taken initiatives in the region in mid 90s in bringing about an ATM network based on elements of radars, display processing RCAG and AMSS. Tracking back the history, the urgency for a modern and enhanced ATS environment, had been realised in early 80s and CAA had developed a plan to introduce a cohesive, integrated, and automated aeronautical communication and control system. In this plan positive air traffic control would be exercised through commissioning of secondary radars, execution of a remotely controlled VHF communication network was foreseen and replacement of the manual and outdated aeronautical fixed telecom network (AFTN) message switch with an AMSS was planned. This concept adopted a system approach that exercised a high level of interaction between sub-systems. Although the sub-systems were to operate independently, a number of decisions were to depend on each other, the sum being far more valuable than the parts.

2. DETAILS OF RADAR NETWORK PROJECT

2.1 The plan had following objectives:

- a) to monitor and enhance the ATS ground control environment, to satisfy the needs of users, ICAO and IATA and honour bilateral commitments;
- b) to meet growth demands of airspace users with minimum constraints and maximum air safety and fuel efficiency;
- c) to achieve a cohesive, integrated and coordinated national ATS system; and

- d) to disseminate ATS information in near real time.

2.2 The integrated radar network was thus commissioned as per this plan in October 1996 and is in operational use since then. In CAA network, the primary radars have been configured as terminal radars for the three international airports Karachi, Lahore, and Islamabad. Three secondary radars are co-mounted with primary radars at these airports as en-route radars to give a complete control over the airspace around these airports. Three more stand alone SSRs are used, in combination with the co-mounted SSRs to provide complete and extended coverage to air traffic all over Pakistan's airspace. The ATM thus brought about comprises two area control centres (ACCs) at Karachi and Lahore that upgrade the Southern and Northern FIRs of Pakistan to automated FICs. Pakistan's ACCs are configured for RDP, FDP and are interfaced with AMSS for acquisition and processing of flight data.

2.3 RCAG VHF stations have been established at the radar and other remote sites which are controlled from Karachi and Lahore ACCs via VSAT network for providing enroute ground-to-air VHF communication. Similarly RCAG UHF has been implemented to provide enroute communication between air traffic controllers and military aircraft flying in the controlled civil air space of Pakistan for better coordination and safer flying.

2.4 The RCAG VHF sites are:

- a) Pasni;
- b) Karachi;
- c) Hyderabad;
- d) Quetta (Lak Pass);
- e) Faisalabad;
- f) Rojhan; and
- g) Laram Killa.

2.5 An AMSS (automated message switching system) has been configured in CAA network for interfacing with AFTN. The AMSS has been installed at Karachi for exchanging message with neighbouring states and FIRs and also for exchanging messages to all ATS units in the country. The AFTN messages include the traditional aeronautical messages viz. NOTAMS, flight plans and flight progress data, weather and storm warning status, state of navigational aids and other aeronautical information.

2.6 The connectivity of AMSS for CAA Pakistan, is as under:

- a) Karachi — Muscat;
- b) Karachi — Tehran;

- c) Karachi — Beijing;
- d) Karachi — Dehli;
- e) Karachi — Mumbai; and
- f) Karachi — Cairo.

2.7 The quantum of aeronautical communication and control systems of Pakistan comprises:

- a) three primary surveillance (terminal approach) radars installed at Karachi, Lahore and Islamabad International Airports;
- b) six secondary surveillance radars deployed for enroute monitoring installed at Karachi, Pasni, Lakpass (Quetta) Rojhan, Lahore and Islamabad;
- c) radar automation, networking the radars of each FIR to respective area control centre (ACC), at Karachi or at Lahore (two ACCs for the entire airspace);
- d) extended range VHF communication through execution of seven remote-controlled ground/air stations installed throughout Pakistan; and
- e) an automated message switching system installed for the aeronautical fixed telecommunication network (AFTN), interfacing with the adjacent FIRs and connected with national network as well as forming a link in the chain of international civil aviation communication network.

3. PHASED TRANSITION TO FANS-1

3.1 The integrated Radar RCAG VSAT network was commissioned in 1996 and has since then been in operational use. Implementation of CNS/ATM has therefore not been a priority matter for CAA Pakistan hitherto in view of the availability of the radar network. However, taking cognizance of developments in the region and in line with Asia/Pacific plan for new CNS/ATM systems, we are taking measures to implement FANS 1 in our ATC system. Pakistan is strategically located along international trunk air routes between Asia and Europe. Implementation of ADS—CPDLC by placing one work station each at our Karachi and Lahore ACCs would contribute towards implementation of FANS routes in the region. Keeping in view our existing surveillance capability, we should prefer an upgradation of our system to include merger of ADS and radar tracks on work stations imbedded with CPDLC features on a long term basis. As an interim measure stand alone work station with connectivity with SITA for delivery of FANS application is under consideration. The FANS work station would be configured to provide common functional behaviour for datalink operations with aircraft using ICAO ATN standards and non-ATN communication standards such as FANS 1.

3.2 This solution would enable ATS providers to exchange ADS and CPDLC data with FANS and ATN equipped aircraft. The SITA network would be connected to existing flight data processing system and would provide ADS contracts management as well as CPDLC dialogue handling. The ADS application

implemented in the ADS—CPDLC gateway will enable CAA Pakistan to exploit the information received from ADS FANS 1 equipped aircraft. The foreseen ADS display would use ADS information to create an air situation display showing the position and vector of the air craft with which the ground has ADS contracts.

3.3 As the next step it is intended to implement ADS-B, taking advantage of progress made by other countries in the region on ADS-B technology and the reports put up by participants in CNS/ATM 1C SG/10 and CNS/MET SG/7 meetings on trials made on same. ADS-B ground stations are foreseen to augment radar coverage as gap fillers in our radar ATM. This would be accomplished in association with PIAC and other airlines using Pakistan's air space so that installation of ADS-B avionics and upgradation of air traffic radar display processing systems at Pakistan's ACCs can be accomplished simultaneously.

4. CONCLUSION

4.1 Successive implementation of ADS-C, ADS-B, together with connectivity of AMSS with ATN would enable CAA Pakistan to complete the upgradation of its ACCS. The future radar display processing systems at the two ACCs (Karachi and Lahore) are intended to be architected to process radar, ADS-C, ADS-B tracks alongwith flight plan processing and interfacing with upgraded AMSS and ATN.

4.2 Further steps would be taken to complete transition to CNS/ATM systems in line with implementation strategies and milestones set by ICAO.

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