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
1.1 The global ATM operational concept
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SINGAPORE'S CNS/ATM IMPLEMENTATION AND FUTURE PLANS

(Presented by Singapore)

SUMMARY

This paper presents Singapore's experiences in CNS/ATM implementation and its future trials and plans. Singapore supports the ICAO global ATM operational concept and ICAO's efforts to develop ATM functional and operating requirements for a global ATM system.

Action by the conference is in paragraph 5.

1. INTRODUCTION

1.1 Singapore's involvement with ICAO's communications, navigation, and surveillance/air traffic management's (CNS/ATM) activities began in the early 1980's when it participated as a member of the FANS (Future Air Navigation Systems) I and II Committees which developed the FANS concept. The concept was later endorsed as the ICAO CNS/ATM concept at the Tenth Air Navigation Conference in 1991. Since then, Singapore has introduced a number of CNS/ATM services in its flight information region (FIR). Plans are underway to introduce more CNS/ATM technologies to further enhance safety and efficiency in the Singapore FIR.

2. CNS/ATM IMPLEMENTATION IN SINGAPORE

2.1 In the early 1990's, Singapore conducted several trials on ADS (automatic dependent surveillance) and controller-pilot data link communications (CPDLC). This culminated in the introduction of ADS/CPDLC services in 1997 in the Singapore FIR for aircraft beyond VHF radio and radar coverage over the South China Sea. Beginning with a standalone system, ADS/CPDLC capabilities were then integrated into the main ATC system. Today, after six years of operations, more than 90 per cent of B747-400 and B777 aircraft operating in the South China Sea area are routinely logging on to the ADS/CPDLC.

2.2 Safety is a top priority in air traffic management and is one of the guiding principles of the global ATM operational concept. ADS/CPDLC supports the concept by enhancing the safety of aircraft operations and air traffic management. ADS enables controllers to track more accurately the position of aircraft operating beyond radar coverage. In addition, safety alert features incorporated in our ADS system warn controllers of possible aircraft deviations from their intended flight paths and/or cleared flight levels. Controllers have found it much easier to provide air traffic control (ATC) clearances and instructions via CPDLC compared to the static-filled environment of HF. Feedback from pilots has clearly indicated their strong preference for CPDLC especially for its rapid and unambiguous responses.

2.3 The provision of timely and accurate information for the ATM community to make informed decisions is another guiding principle of the global ATM operational concept. Datalink communications has provided an alternative reliable and efficient channel for the exchange of information. Singapore has offered automatic terminal information service (ATIS) datalink service since February 2000. Pilots can obtain printouts of ATIS reports in the cockpits and can choose to receive automatic updates of ATIS reports. Not only does this cut down pilots' workload, it also minimizes human error during the receiving of ATIS reports.

3. NEW CNS/ATM APPLICATIONS IN PROGRESS

3.1 Singapore is proactively keeping itself abreast of new technological developments and looking into possibilities of harnessing new technology in enhancing air traffic management. Trials on new CNS/ATM applications are being planned for, with the view to introduce new services at Singapore Changi Airport and in the Singapore FIR.

3.2 ADS-B

3.2.1 As highlighted in the ADS-B Concept of Use developed by the ICAO Operational Data Link Panel, ADS-B functionality has the potential to be one of the key elements necessary in achieving the goals of the global ATM operational concept. ADS-B would enable surveillance coverage for all phases of flight, providing radar-like air traffic control and enhanced situational awareness on the flight deck. As a member of the new ASIA/PAC Air Navigation Planning and Implementation Regional Group (APANPIRG) ADS-B Review and Implementation Task Force, Singapore is following the developments of ADS-B closely and developing plans to introduce ADS-B.

3.2.2 To evaluate the possible applications of ADS-B in our environment, Singapore is planning to conduct ADS-B trials in phases over the next three to five years. The trials would start with ADS-B equipped ground vehicles and aircraft at the aerodrome. The Changi Airport Surface Detection Equipment will be upgraded with new multilateration dependent surveillance technology to enhance identification and monitoring

of the movements of vehicles and aircraft on the airfield. This will also improve the detection of ground conflicts, especially in low visibility conditions.

3.3 **ATN**

3.3.1 Singapore is actively participating in the ICAO Asia/Pacific Aeronautical Telecommunications Network (ATN) Transition Task Force to develop transition plans for the implementation of ATN in the region. Being one of the major aeronautical telecommunication centres in the region, Singapore will be implementing a ground-ground ATN system by 2005, as part of the ATN Backbone network to be set up in the Asia/Pacific region. This is in line with the ATN transition plan for the region whereby other countries in the region will gradually migrate from aeronautical fixed telecommunication network (AFTN) to ATN by linking to one of the ATN Backbone routers by 2010.

3.4 **GNSS**

3.4.1 For several years, Singapore has been collaborating with the United States Federal Aviation Administration (FAA) to collect data from a global positioning system (GPS) receiver located at Changi Airport on how sunspot activities could affect GPS signals. The effects of sunspot activities on GPS signals are more pronounced in our region than in the temperate countries, being nearer the Equator. Singapore has also supported ICAO in coordinating a GPS Monitoring Campaign for the Asia/Pacific region in 2001, to determine the normal and peak GPS performance in this region. New GPS non-precision approach procedures will be implemented at Singapore Changi Airport by the end of this year to back up existing approach procedures.

4. **GLOBAL ATM OPERATIONAL CONCEPT**

4.1 ICAO's development of the global ATM operational concept is timely and welcomed by Singapore. The global ATM operational concept provides a common vision for the coordinated implementation of CNS/ATM technologies and describes comprehensively what a global ATM system would comprise. As the basis for the harmonized introduction of CNS/ATM technologies across regions, the concept would guide Singapore in its CNS/ATM implementation plans.

4.2 Having described the ATM vision through the operational concept, ICAO has identified several actions for it to follow-up, to facilitate transition from a conceptual phase to the implementation phase. In particular, there is the need to define ATM requirements which will then form the basis for the design and planning of the ATM system, as well as incorporate the ATM operational concept into the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750). Singapore supports ICAO's efforts in these areas.

5. **ACTION BY THE CONFERENCE**

5.1 The conference is invited to:

a) note Singapore's implementation of CNS/ATM and its future plans for CNS/ATM, as well as Singapore's support of the global ATM operational concept; and

b) endorse the global ATM operational concept developed by the ICAO Air Traffic Management Operational Concept Panel (ATMCP) and support ICAO's efforts to develop a clear set of ATM functional and operating requirements for a global ATM system as well as incorporate the concept into the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750).

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