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ASSEMBLY — 37TH SESSION

TECHNICAL COMMISSION

Agenda Item 37: Development of an up-to-date consolidated statement of continuing ICAO policies and practices related to a global ATM system and communications, navigation and surveillance/air traffic management (CNS/ATM) systems

ACTIVITIES OF THE REPUBLIC OF KOREA ON THE IMPLEMENTATION OF THE CNS/ATM SYSTEMS

(Presented by the Republic of Korea)

EXECUTIVE SUMMARY

The Republic of Korea (ROK) has made constant efforts for the improvement of its air navigation systems in accordance with the ICAO plans for implementation of the new communications, navigation, surveillance/air traffic management (CNS/ATM) worldwide, and many substantial outcomes have been made.

This paper provides information on the CNS/ATM-related activities of the ROK, including its R&D plans and international cooperation efforts, and introduces the achievements in the areas of the aeronautical telecommunications network (ATN), global navigation satellite system (GNSS) and automatic dependent surveillance-broadcast (ADS-B).

Strategic Objectives:	This working paper relates to Strategic Objectives A, D and E on safety, efficiency and continuity.
Financial implications:	None.
References:	Annex 10 — *Aeronautical Telecommunications* Doc 9750, *Global Air Navigation Plan*

1. INTRODUCTION

1.1 To meet growing air traffic demands and to ensure aviation safety, ICAO introduced its plan to implement the new communications, navigation, surveillance/air traffic management (CNS/ATM) system. ICAO recommended the newly adopted CNS/ATM standards utilizing the satellites and digital communication technologies to the States so that the States can gradually transit from the conventional systems to the new systems.

1.2 The Republic of Korea (ROK) has strived to make the transition from the conventional systems to its new system. Through the transition to a new system, the ROK not only deals with rapidly increasing air traffic effectively but also cuts its greenhouse gas emissions by reducing aircraft waiting and flying time.

2. COMMUNICATIONS

2.1 In the aeronautical communications field, the ROK has been conducting R&D and implementation activities by focusing on the VHF data link and Mode S transponder technologies for the terminal and en-route airspace, and the aeronautical mobile satellite service (AMSS) and HF for oceanic and remote airspaces, as shown in the following table:

Technologies & Applications	Implementation plans									
	Descriptions	Completed ('05-'09)			Short term ('10-'14)			Mid term ('15-'18)		
VDL 1,2,3,4 Mode S Data link	➢ VDL M2 development	▬	▬	▬						
	➢ VDL M2 introduction		▬	▬	▬	▬	▬			
	➢ Regional DSP development & implementation				▬	▬	▬	▬	▬	▬
HFDL AMSS	TBD TBD									
ATN/AMHS	➢ ATN implementation and connection with China		▬	▬						
	➢ ATN connection with Japan				▬	▬	▬			
D-PDC, D-ATIS	➢ System upgrade	▬	▬	▬	▬	▬				
AIDC	➢ Implementation with Japan		▬	▬						
	➢ Implementation with China				▬	▬				
Next generation Aviation Communication Tech'	➢ Development and Implementation				▬	▬	▬			

2.2 The ROK has successfully developed the VDL (VHF Data digital Link) Mode 2 technologies in 2009 through a series of flight tests, using commercial air transport aircraft. A feasibility study using these technologies will be conducted within 2010 to identify the possibility of establishing independent regional data link service provider (DSP).

2.3 Furthermore, in accordance with the latest ICAO Asia-Pacific Air Navigation Plans, the ROK finalized the ATN addressing plan in 2009, and the ATN/AMHS (ATS Message Handling System) systems will be implemented by the end of 2010. The operation test will be gradually conducted with its neighboring States, China and Japan.

2.4 The replacement of analogue circuits with digital circuits in communication systems is in process and the digital circuits is expected to guarantee a lower level of system defects, enhanced reliability and faster data exchanges.

2.5 From 2010 to 2014, researches on the next generation aviation communication technologies will be continued. The System Wide Information Management (SWIM) and data link technologies will be explored, developed and applied to the air navigation services in the ROK. Through continued efforts for the development of the communications technologies, the aircraft operations in the ROK are expected to be greatly improved in terms of the efficiency and safety.

3. NAVIGATION

3.1 The transition to the satellite based air navigation system from the conventional ground based air navigation system, such as the VOR/DME and ILS, is being made in the ROK. The following table shows the progress to date:

Technologies & Applications	Implementation plans			
	Descriptions	Completed ('05-'09)	Short term ('10-'14)	Mid term ('15-'18)
GNSS for En-route	➢ GBAS Test Bed			
	➢ GPS Signal Alert systems			
	➢ GPS Monitoring systems			
GNSS Terminal, Approach and En-route	➢ Technical development for GBAS operation			
	➢ Development of GBAS approval system			
	➢ GBAS Installation & Operation (CAT I → CAT II, III)			
	➢ Feasibility study on GNSS Wide Area Augmentation System			
	➢ Installation of GNSS Wide Area Augmentation System			

3.2 Many airports in the ROK are located in mountainous regions and a significant level of constraint has to be overcome to install the ILS in those airports. Therefore, the aircraft landing system using GNSS technologies has drawn attention in the ROK because of its effectiveness and flexibility in the establishment, operation and maintenance aspects.

3.3 As one of the main technologies in air navigation systems, the ROK has put considerable efforts to develop the ground-based augmentation system (GBAS) since early 2000. A GBAS test bed has been established in Jeju and its GNSS integrity monitoring capability has been continuously analyzed and updated. The ROK is now moving its attention to the operational side and related R&D programme will be conducted between 2010 and 2018.

4. SURVEILLANCE AND AIR TRAFFIC MANAGEMENT

4.1 Although most of the Incheon Flight Information Region (FIR) is sufficiently covered by the conventional primary and secondary radar systems, the ROK is willing to develop next generation surveillance system, such as the automatic dependent surveillance — broadcast (ADS-B). The next generation surveillance technologies will eventually lead to a better concept of air traffic management as well as increased safety and capacity of the ROK's airspace system.

Technologies & Applications	Implementation plans			
	Descriptions	Completed ('05-'09)	Short term ('10-'14)	Mid term ('15-'18)
SSR Mode S ADS-B(TIS-B, FIS-B) Multilateration	➢ SSR Mode S replacement			
	➢ ADS-B Implementation			
	➢ Multilateration Implementation			
A-SMGCS	➢ System upgrade			
ATM	➢ New ATM Systems Development			
	➢ ATFM Implementation			
	➢ ATMS Implementation			

4.2 Within the Incheon FIR, there are 15 airports and dozens of air traffic services (ATS) routes which are under surveillance based on en-route radars, approach radars and surface surveillance radars. The ROK is, however, facing an increasing level of problems associated with cost in the establishment, maintenance and operation of radar facilities along with environmental resistance caused by the construction of radar sites.

4.3 A new concept of ATM and necessary infrastructure will be constantly explored, analyzed and implemented. To make the ATM more flexible and user-friendly, the trajectory-based operation will be focused in the near future and the necessary technologies, such as the trajectory modeling and estimation, will be developed.

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