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ASIA AND PACIFIC REGIONS**

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**AGENDA ITEM 4: AIR NAVIGATION**

**REPUBLIC OF KOREA'S NATIONAL AIR NAVIGATION PLAN 2.0  
PLANNING AND IMPLEMENTATION MANAGEMENT**

Presented by the Republic of Korea

**INFORMATION PAPER**

**SUMMARY**

The Republic of Korea jointly established the national navigation plan "NAR AE 2.0" in order to keep pace with the changes in the navigation environment proposed by ICAO through GANP, ASBU, and APAC Seamless ANS Plan, and in the future aviation environment such as the emergence of new technologies and aerial vehicles including AI, big data, and UAM. The Republic of Korea is implementing the plan by operating a consultative body involving related agencies and making necessary financial investments. It is also imperative to establish a cooperative system among the Asia-Pacific countries to promote information exchange for effective planning and implementation management.

## REPUBLIC OF KOREA'S NATIONAL AIR NAVIGATION PLAN 2.0 PLANNING AND IMPLEMENTATION MANAGEMENT

### 1. INTRODUCTION

1.1 The Republic of Korea's aviation traffic increased an average of 6.3% over 10 years between 2009 and 2019, before the outbreak of COVID-19. The country ranked the world's seventh in air transportation (13th in passenger and fifth in cargo). The Ministry of Land, Infrastructure and Transport first established the mid-to-long term plan "NARAE 1.0" in 2015 to efficiently handle and stably manage the rapidly increasing air traffic and has supplemented the plan twice in March 2017 and in December 2018.

1.2 Despite such revisions and supplementation, NARAE 1.0 not only had limitations in responding to unexpected environmental changes such as the advancement of air traffic technologies and the outbreak of COVID-19 but it also failed to provide a driving force to pursue close cooperation with related government agencies, which is essential for securing large scale budgets and expanding infrastructure. It was largely because NARAE 1.0 was a plan developed by a single ministry, the Ministry of Land, Infrastructure and Transport, not at the pan-government level.

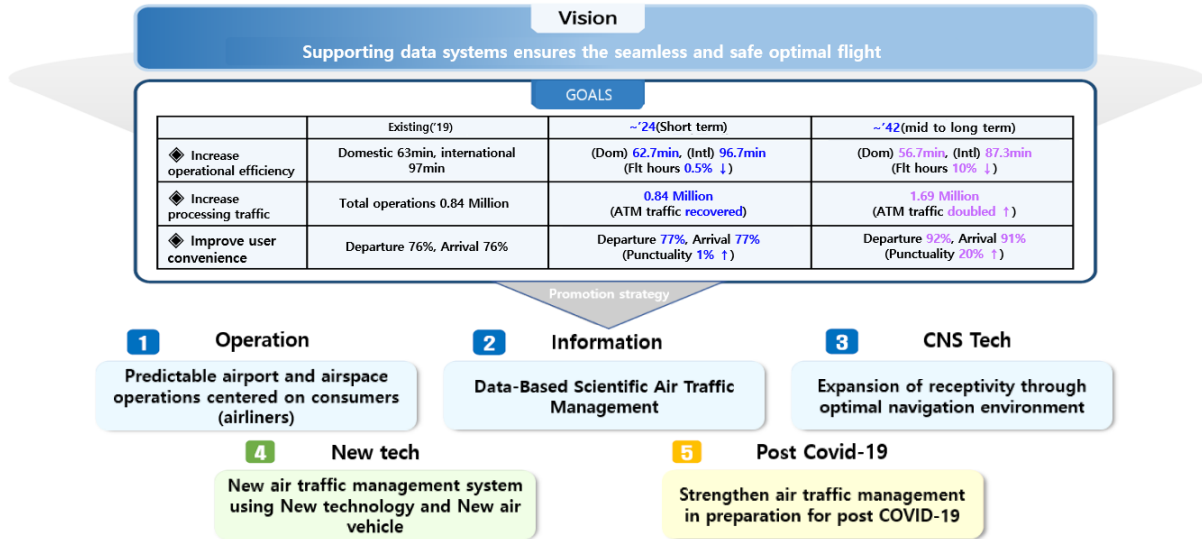
1.3 In particular, managing airspace is a great challenge for the Republic of Korea due to the nature of its national security situation and the intertwined use of airspace by civil and military aircrafts. The problem of delayed flight operation due to increased traffic volume in limited airspace has been continuously raised, but an efficient airspace management system has not been in place, causing inefficiencies in air traffic management.

1.4 In addition, the international community, including the International Civil Aviation Organization, is urging States to adopt data and system analysis and make a transition to a prediction-based scientific air traffic management system in preparation for the recovery of air traffic expected to take place around 2024. On August 5, 2021, the Ministry of Land, Infrastructure and Transport announced "NARAE 2.0", a national navigation plan that includes five promotion strategies, 14 major tasks and 43 detailed tasks, after collecting expert opinions through 11 meetings with related ministries including the Ministry of Defense and the Korea Meteorological Administration.

### 2. ROK's NATIONAL AIR NAVIGATION PLAN – "NARAE 2.0"

2.1 NARAE 2.0 was established based on the ICAO Global Navigation Plan, Regional Navigation Plan, and ASBU Framework. Three basic promotion strategies were developed based on the Functional Classification System under ICAO ASBU's essential Navigation Services Framework (Basic Building Block) under three categories of i) Operation(demand-centered), ii) Information (data based air traffic management), and iii) Technology (CNS Tech: optimized navigation environment). They were supplemented with two special tasks, iv) Establishment of an air traffic management system using new technologies such as AI or Metaverse technology and new aerial vehicles such as UAM, and v) Enhancement of air traffic management in preparation for the post-pandemic era.

2.2 14 sub-goals were selected for the five promotion strategies. Key sub-goals include flexible airspace operations through civil and military cooperation, construction of a 4D trajectory-based operating system, capacity expansion, the creation of a comprehensive aviation data management system and a new aircraft traffic management system, satellite-based monitoring capability enhancement, and reduction of user burden by expanding straight flights.



<NARAE 2.0 Vision, Goals, and 5 Promotion strategies>

2.3 The analysis results of the applicability of each element of ICAO Global Air Navigation Plan (GANP), ASBU and ICAO Asia Pacific Seamless ANS Plan are shown in Tables 1 and 2. The applicable elements are indicated as √, the elements that need further review are indicated as △, and the unapplied elements are indicated as \*. The tasks under ASBU B2/B3 will be subject to further review to determine their applicability and will be supplemented later in the mid-to-long term plan.

Functional Category	Thread	B0	B1	B2	B3	B4	Reference
Information	AMET	√	√	△	△	△	Advancement of meteorological Information
	DAIM		√	△			Digital aeronautical information management
	FICE	√		√	△	△	Flight information for collaborative Environment
	SWIM			√	△		System wide information management
Operation	ACAS		√	√			Airborne collision avoidance system
	ACDM	√	√	(B2/2 △)	△		Airport collaborative decision making
	APTA	√ (B0/6 *)	√ (B1/2~3 △)	√ (B2/2~3 △)			Airport accessibility
	CSEP		√ (B1/1 △)	√	△	△	Collaborative separation
	FRTO	√ (B0/4 △)	√ (B1/2, 5 △)	△			Flexible flight route operation
	GADS		√	△			Global aviation distress and safety system
	NOPS	√	√	√	△		Air traffic flow management network operation
	OPFL	△	△				Use of optimum flight level
	RATS		√				Remote airport tower control
	RSEQ	√	△	√	√ (B3/1, 2, 4 △)		Runway sequence
	SNET	√	√				Ground-based flight safety network construction
	SURF	√	√	√	△		Improvement of surface operations
TBO	√	√	√	△	△	Trajectory-based operations	

	WAKE			√	△	△	Wake turbulence separation
Technology	ASUR	√	√	√ (B2/2 △)	△	△	Alternative surveillance system
	COMI	√ (B0/2~3 △, B0/5~6 *)	√ (B1/2~3 △)	△	△		Communication infrastructure
	COMS	√ (B0/2 △)	△	△	△		ATS Communication service
	NAVS	√ (B0/3~4 △)	√		△		Navigation systems

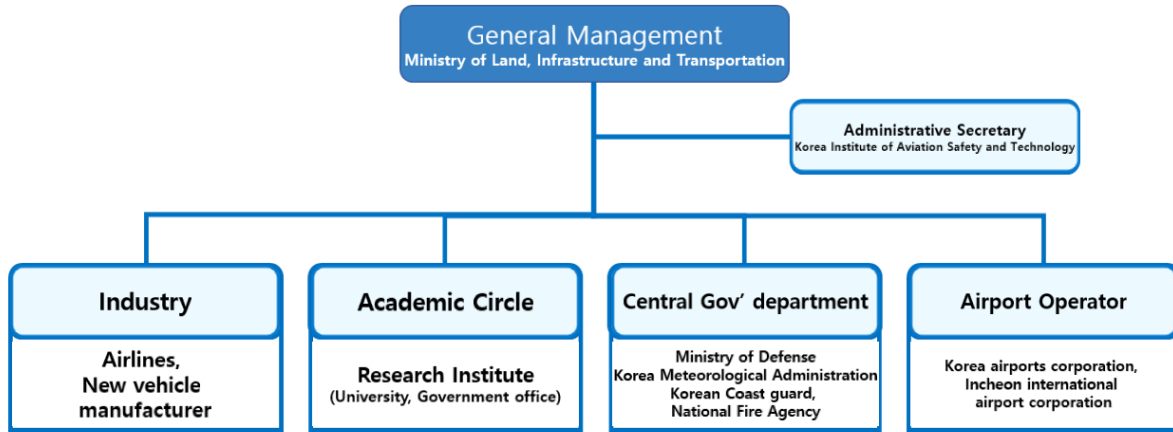
<Analysis of the Applicability of Table 1 GANP ASBU Elements>

Functional Category	Regional Seamless ANS Element	Result
Operational	Aerodrome management and coordination (PARS 7.1)	√
	Optimization of runway capacity facilities (PARS 7.2)	√
	ADS-B, SSR Mode S and PBN Airspace (PARS 7.8, 7.9, 7.10)	√ (ADS-B △)
	Flight Level Orientation Scheme (FLOS) (PARS 7.12)	√
	Civil/Military SUA management (PARS 7.13)	√
	Adjacent ATS sector coordination (PASL 7.19)	√
	Airspace classification (PASL 7.28)	√
	ATC horizontal separation (PASL 7.29)	√
	Flight Level Allocation Schemes (FLAS) (PASL 7.30)	√
	ATC sector capacity (PASL 7.32)	√
	Electronic Flight Progress Strips (PASL 7.34)	√
	Enhanced SAR systems (PASL 7.37)	√
	ANSP human and simulator performance (PASL 7.38)	√
	Civil/Military strategic and tactical coordination (PASL 7.39)	√
	Civil/Military common procedures and training (PASL 7.39)	√
Ballistic launches/space re-entry management (PASL 7.40)	△	
Unmanned Aircraft Systems (PARS TBA)	√	
CNS Technology and Services	ATS surveillance data sharing (PASL 7.23)	√
	Civil-Military integrated systems and facilities (PASL 7.39)	√
	Departure Clearance (DCL) (PASL 7.44)	√

<The analysis of the applicability of Table 2 the Asia-Pacific navigation plan of Elements>

2.4 The Korean government has invested about KRW1.1 trillion in the implementation of the NARAE plan and air transportation system improvement projects over the past 10 years and plans to invest an additional KRW 363.7 billion for a five year period from 2021 to 2025 to implement NARAE 2.

2.5 In addition, to swiftly revise and supplement the plan considering the environmental changes that may occur during the implementation of NARAE 2.0 and to monitor the implementation progress of the detailed implementation plan, the Korean government is systematically promoting NARAE 2.0 through the "working-level consultative group" (working-level) and "promotion consultative group" (high-level) consisting of representatives from related ministries such as the Ministry of Defense, the Korea Meteorological Administration and experts from industry, academia and research institutes. In order to ensure the effectiveness of the plan, legislation is being prepared to establish legal basis for the development and implementation of a national navigation plan.



**【 NARAE Organization chart 】**

2.6 The Republic of Korea aims to provide safe and efficient air traffic service to the public by preemptively responding to the surge of air traffic volume through NARAE 2.0, establishing the trajectory-based operation (TBO) system, and laying the foundation for the growth of new industrial sectors by actively utilizing latest air traffic technology. Based on an uninterrupted implementation of NARAE 2.0, the Republic of Korea has set a goal of more than doubling its overall air traffic capacity by increasing the safety of air traffic by 50%, operational efficiency by 10%, and flight punctuality by 20%, and reducing the environmental impact of carbon dioxide (CO2) emissions and fuel costs by 11%, respectively. According to the results of a June 14, 2021 study by the Korea Aerospace Research Institute, reduced flight delays and shortened operating hours will bring economic benefits of 12.1 trillion won to airlines and airport operators, create 90,000 related jobs and reduce CO2 emissions by more than 35 million tons.

**3. ACTION BY THE CONFERENCE**

3.1 The Conference is invited to note the information contained in this Paper and to share each state’s NANP among all stakeholders, including ICAO APAC Regional Office for information.

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