

**53rd CONFERENCE OF
DIRECTORS GENERAL OF CIVIL AVIATION
ASIA AND PACIFIC REGIONS**

*Colombo, Sri Lanka
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AGENDA ITEM 3.3: AIR NAVIGATION MATTERS

**STATUS UPDATE OF THE LONG-TERM VISION FOR THE
FUTURE AIR TRAFFIC SYSTEMS IN JAPAN (CARATS)**

(Presented by Japan)

INFORMATION PAPER

SUMMARY

This Paper presents the information about status update of the long-term vision for the future air traffic system in Japan, namely “CARATS: Collaborative Actions for Renovation of Air Traffic Systems”. Progress information of CARATS can be obtained from the following website: http://www.mlit.go.jp/koku/koku_CARATS.html .

STATUS UPDATE OF THE LONG-TERM VISION FOR THE FUTURE AIR TRAFFIC SYSTEMS IN JAPAN (CARATS)

1. INTRODUCTION

1.1 The 4th edition of the Global Air Navigation Plan (GANP) indicates comprehensive direction for the globally harmonized air navigation systems with safe, effective and efficient air traffic. GANP also provides the various measures and technology development, in form of time series block, as Aviation System Block Upgrades (ASBUs) frameworks and Technology Roadmaps. States can consider the effectiveness of each measure, decide priorities and establish the national plan for improvement of air navigation services in accordance with their local circumstance.

2. DISCUSSION

2.1 The long-term vision for the future air traffic systems in Japan

In Japan, in order to correspond appropriately to the growth in air traffic demand as well as the diversified needs of users, through the collaboration of industry, academia and government, the future of the air navigation services have been examined from various angles and also based on global trends. In 2010, Japan Civil Aviation Bureau (JCAB) established "The long-term vision for the future air traffic systems (CARATS: Collaborative Actions for Renovation of Renovation of Air Traffic Systems)" which describes goals aimed at for 2025, directions of renovation, etc. CARATS sets improvement of safety, correspondence to the growth in global air traffic demand, improvement of user-friendliness, improvement of operational efficiency, etc. as goals. CARATS has identified following eight items as the directions of renovation to achieve the goals, with a core of the "Trajectory Based Operations (TBO)", the various measures have been considered based on those directions.

- Realization of TBO
- Improvement of predictability
- Promotion of Performance Based Operation
- Implementation of satellite navigation in all flight phases
- Improvement of the level of situational awareness on the ground and on board an aircraft
- Maximum utilization of human and machine capability
- Ensuring information sharing for collaborative decision-making
- Realization of high-density aircraft operations at busy airports and congested airspace

Furthermore, JCAB scrutinizes GANP policy, the ASBUs and Technology Roadmap, and, if necessary, reviews CARATS roadmap for harmonized deployment along with global trend.

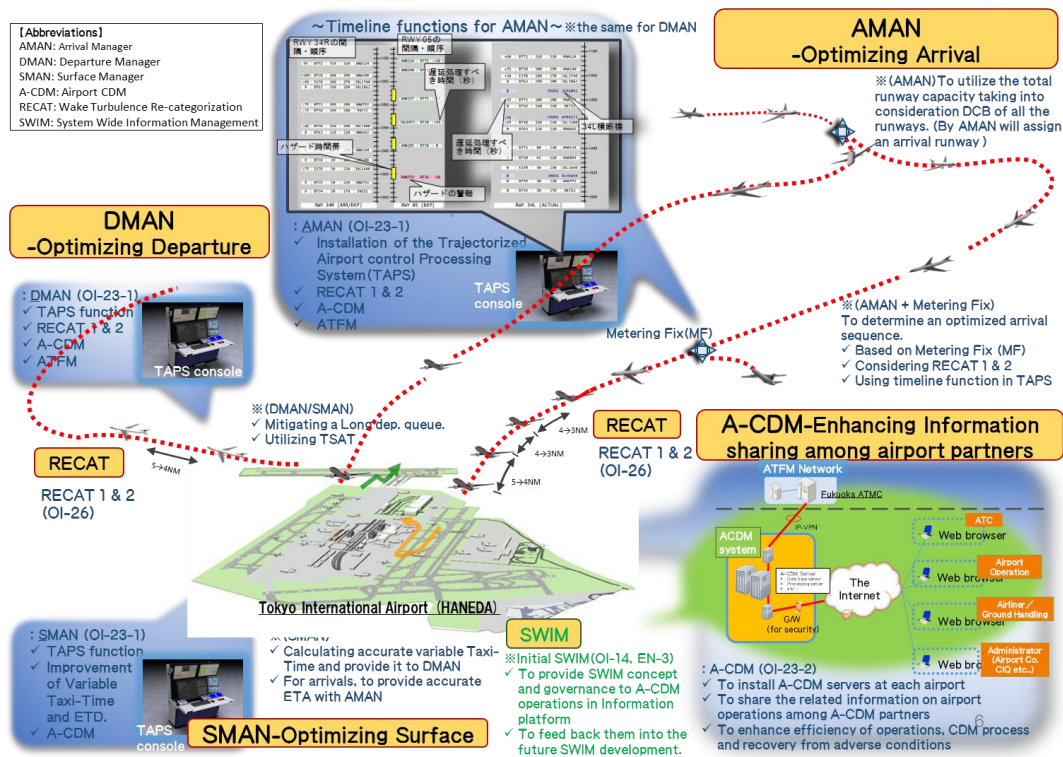
2.2 The content of main CARATS measures

- a) Improved efficiency in ATC operations (take-offs/Landings) and surface management (AMAN/DMAN/SMAN)

With AMAN (Arrival Management), DMAN (Departure Management) and SMAN (Surface Management) coordination, JCAB controls traffic flows effectively at airports including Tokyo Haneda and Tokyo Narita airports where airport surface and runway operations are difficult and complicated. This enables the airports to maximize the use of its available resources including runways, and thus airport capacity have been increased to meet the ever-growing demand in air traffic in the Tokyo metropolitan area.

The Olympic and Paralympic games will be held in Tokyo in 2020. So, JCAB is going to expand the TOKYO Approach Control Area (ACA) and also reform the surrounding sectors of Tokyo Area Control Centers in 2019.

Furthermore, some CARATS measures are established to improve operations for the Metropolitan airports, which are time-based metering at merging points, improved efficiency of aerodrome operations (AMAN/DMAN/SMAN), Airport CDM (A-CDM), reduced wake turbulence separation minima (RECAT) etc. Each measures will also start their operations from around 2019, and some of them will be developed in a phased manner.



CARATS challenge for 2020 in Metropolitan Airports (For TOKYO HANEDA)

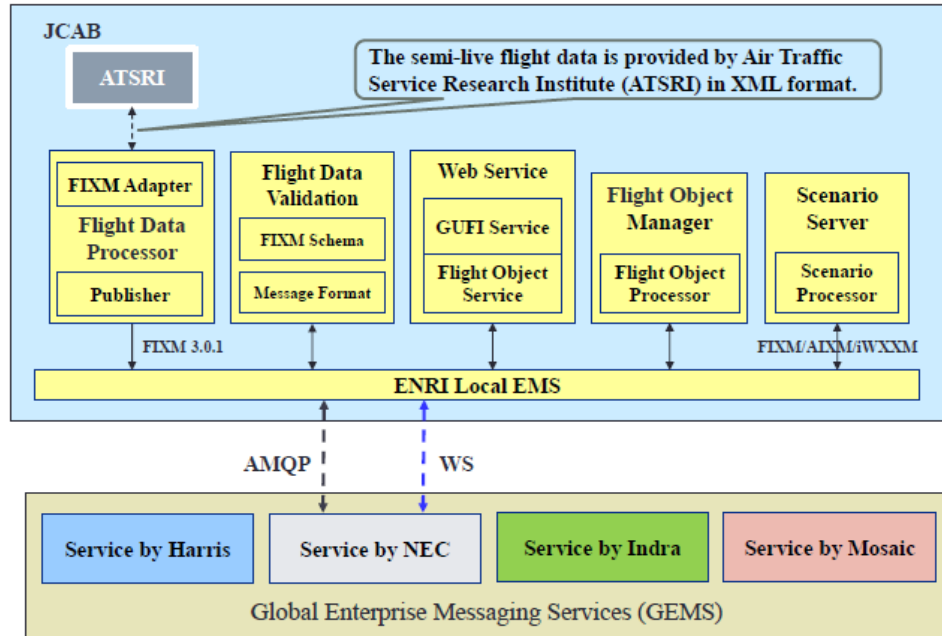
b) Information sharing infrastructure (SWIM: System Wide Information Management)

In order to implement the measures on Information-Sharing for Collaborative Decision-Making, wide range of mass data must be shared among as many stakeholders as possible. If all stakeholders share data with each other through the old-style interconnection, it costs them a lot of money to build the systems and circuits and do the test. Therefore, the cost-effectiveness new information sharing system, SWIM has been invented.

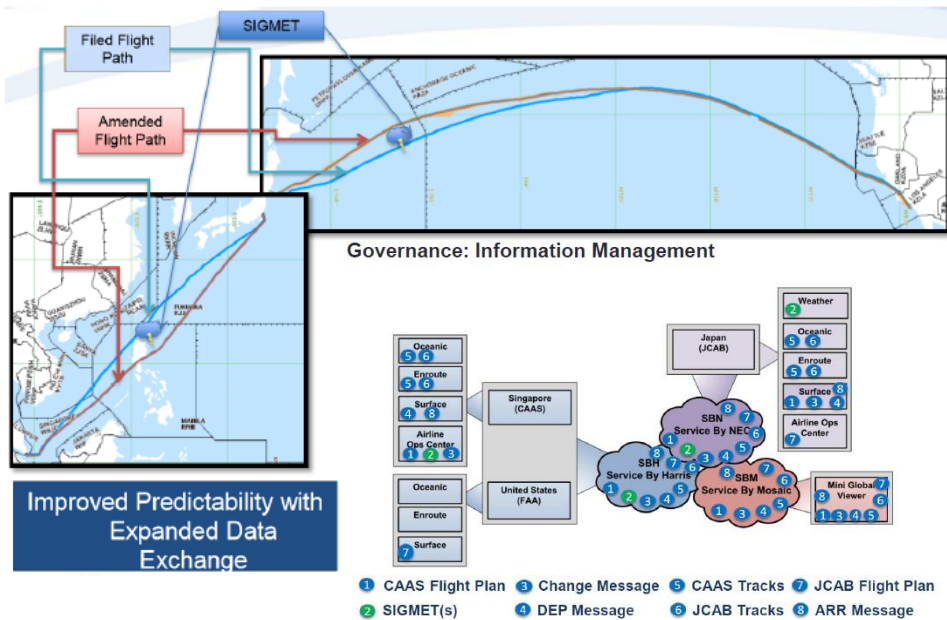
SWIM provides the environment where anyone can access the information on aircraft operations at any time. Furthermore, it ensures the reliability of data in order to maintain the trustworthiness of information for Collaborative Decision-Making.

The implementation of SWIM is also aimed at improving interoperability with surrounding States, and Mini-Global Demonstration II has been conducted to build the comprehensive information management system for the next generation.

Japan, USA, Canada, Singapore, Thailand, UAE, Brazil and others have participated in Mini Global Demonstration to share air traffic management information to demonstrate flexible and effective aircraft operations in various situations.



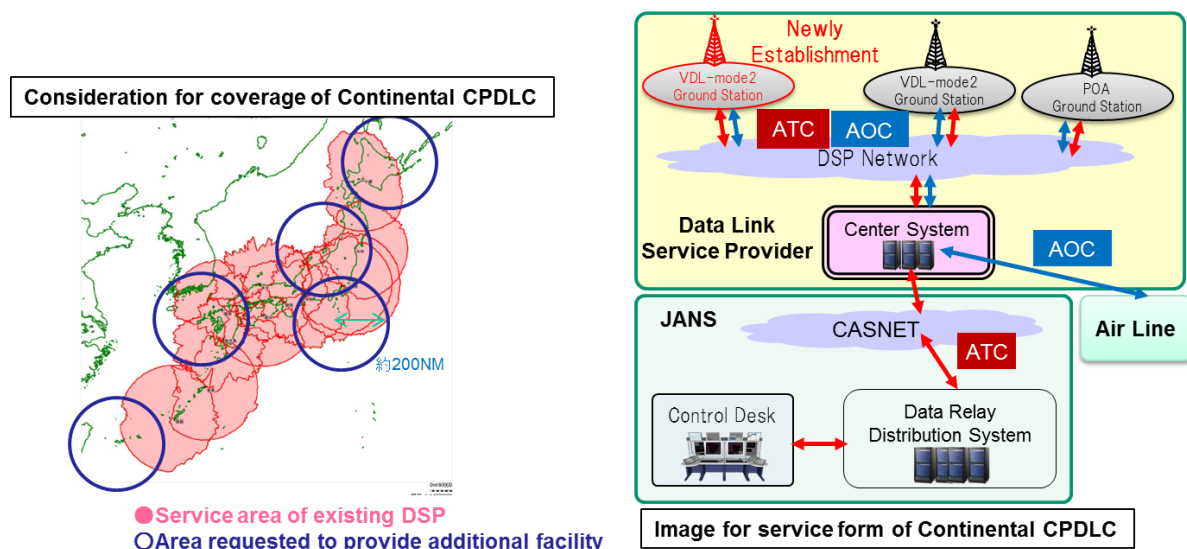
Japan's system configuration for Mini Global Demonstration II



Scenario for Trans-Pacific Operations (SIN-NRT-LAX)

- c) Improvement of the processing capacity of ATC by Continental Controller Pilot Data Link Communication (Continental CPDLC)

By transmitting non-time-critical ATC instruction/clearance as pre-fixed format through the data link in the domestic en-route airspace, Continental CPDLC, ATC processing capacity will be expanded and human error risk will be reduced.



Continental Controller Pilot Data Link Communication

- d) Facilitation of satellite based navigations for all flight phases

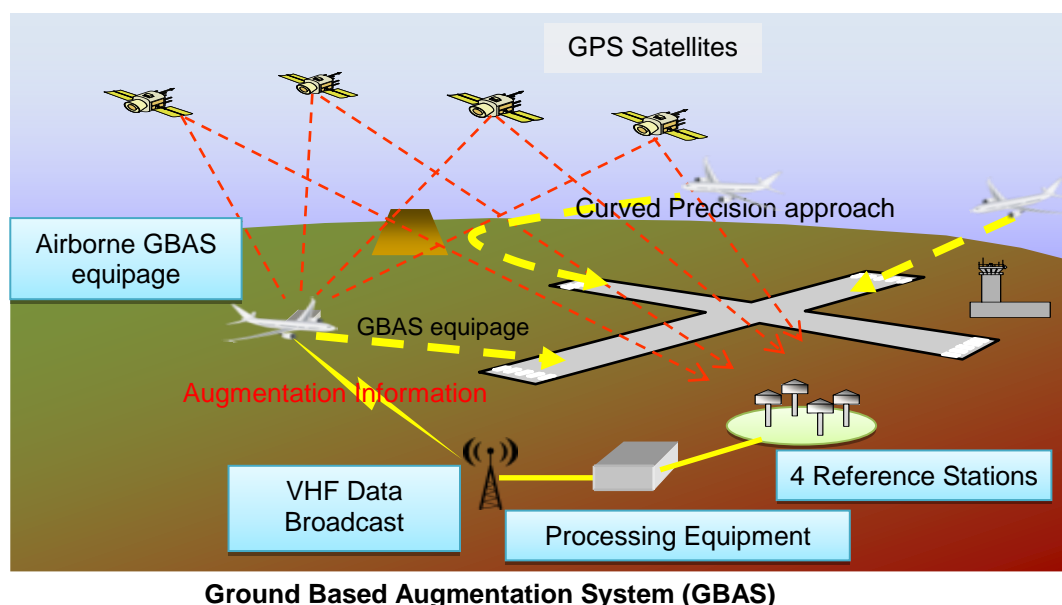
JCAB has decided to implement the GNSS augmentation system utilizing satellite navigation, SBAS and GBAS, and revised CARATS roadmap in FY2014.

Regarding GBAS, the implementation decision was done in the background of positive R&D activities on GBAS conducted by ENRI, and also in consideration of worldwide implementation of GBAS and on the basis of business case study results.

Since compatibility with Japanese ionospheric conditions is necessary for GBAS operation, its design has to be able to mitigate Japanese ionospheric threat, and Japanese certification is required for GBAS system. Japanese ionospheric threat model is defined under cooperation by ENRI.

JCAB decided to install Category-I GBAS in Tokyo International (Haneda) airport as the first GBAS system implementing airport in Japan. Haneda airport is the largest airport in Japan having the maximum traffic volume with four (4) runways.

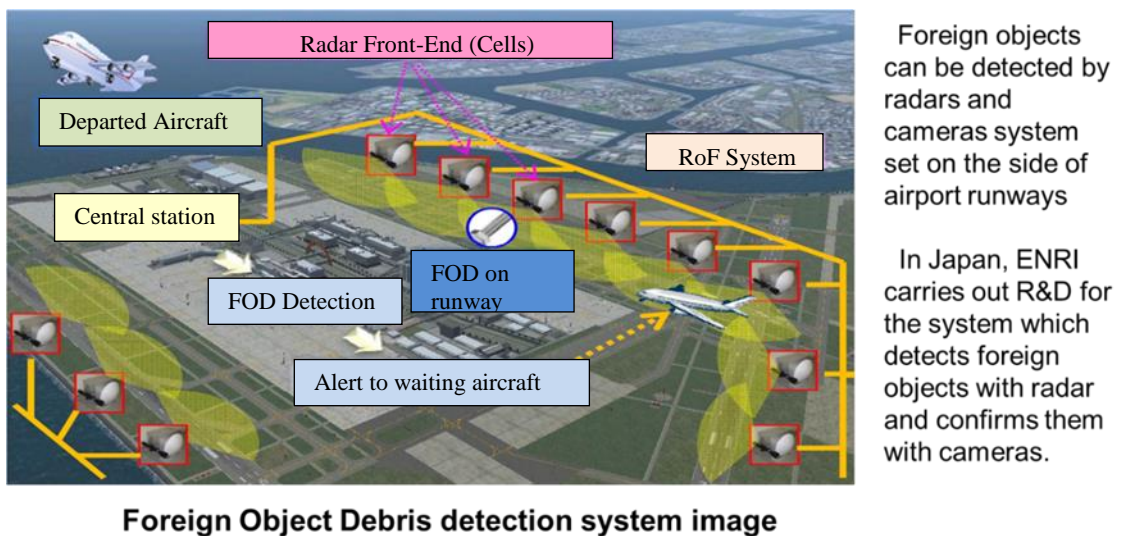
The GBAS installation is to be started from this year and completed by the end of March in 2019 (the end of Japanese Fiscal year of 2018). After the installation the evaluation operation will be conducted, then the start of CAT-I operation is planned before the end of March in 2021 (the end of Japanese Fiscal year of 2020).



Additionally, in order to provide operators the information conforming to the actual operation, JCAB has decided to implement GNSS signal monitoring and RAIM prediction optimization. It becomes possible to reduce operating restrictions by improvement of RAIM prediction performance and user-friendliness, and expanded use of PBN flight with GNSS is expected.

e) Foreign Object Debris detection system

Introduction of a system to detect foreign objects on the runway is expected to contribute to avoid aircraft accidents as a matter of course, it will reduce searching time of foreign objects and consequent runway-close time. Electronic Navigation Research Institute (ENRI) has conducted demonstrations of the Foreign Object Debris (FOD) detection system from last December and could confirm the status of the runway in detail. Furthermore, at night experiments, the FOD detection system could detect approximately 1 inch diameter × 1 inch height metal cylinder placed 450 meters distance away.



2.3 Decision-making and arrangement in the last fiscal year

In consideration of the various social situation and recent ICAO activities, last fiscal year, JCAB made a decision to implement following measures under the collaborative framework with industry, academia and government.

- ◆ Realization of continuous decent/climb operation
 - Realization of operation which enables continuous rise without temporary horizontal flight
- ◆ Conflict detection using orbit information and advancement of information processing system
 - Detection of conflicts by a high-precision orbit monitoring, suggestion of its resolution advisory
- ◆ Improvement of the processing capacity of ATC by automation of routine communication
 - Introduction of current DCL system in other regional airports
- ◆ Provision of satellite based navigations for all flight phases
 - Optimization of RAIM prediction and GNSS performance monitoring

Furthermore, a new measure was agreed to add in CARATS roadmap.

- ◆ Implementation of FOD (Foreign Objects Debris) detection system

2.4 Japanese Contribution through the CARATS

Japan has operated the CARATS, bearing in mind coordination and harmonization with relevant countries, and steadily achieved the improvement of air navigation services, resolving many technical subjects in cooperation with domestic and overseas organizations. Through those activities, Japan intends to correspond to the growth in global air traffic demand in the future and contribute to address various issues in the Asia/Pacific Region.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to note the information contained in this Paper.

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