INTERNATIONAL CIVIL AVIATION ORGANIZATION

TWENTY SEVENTH MEETING OF THE ASIA/PACIFIC AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL GROUP (APANPIRG/27)

Bangkok, Thailand, 5 to 8 September 2016

Agenda Item 3: **Performance Framework for Regional Air Navigation Planning and Implementation**

3.2: **ATM**

STATUS UPGRADE OF THE CARATS IN JAPAN

(Presented by Japan)

SUMMARY

This paper introduces the status of the long-term vision for the future air traffic system in Japan, namely "CARATS: Collaborative Actions for Renovation of Air Traffic Systems". Information of the CARATS can be also obtained from the following website: http://www.mlit.go.jp/common/000128185.pdf.

Strategic Objectives:

A: ***Safety*** *– Enhance global civil aviation safety*

B: ***Air Navigation Capacity and Efficiency****—Increase the capacity and improve the efficiency of the global aviation system*

E***: Environmental Protection*** *— minimize the adverse environment effects of civil aviation activities.*

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) 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

2.1.1 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 established "The long-term vision for the future air

traffic systems (CARATS: Collaborative Actions for Renovation of Air Traffic Systems)" which describes goals aimed at for 2025, directions of renovation, etc. CARATS sets goals like improvement of safety, correspondence to the growth in global air traffic demand, improvement of user-friendliness, improvement of operational efficiency, etc. CARATS also identifies the following eight directions of renovation to achieve the goals, with a core of the "Trajectory Based Operations (TBO)".

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

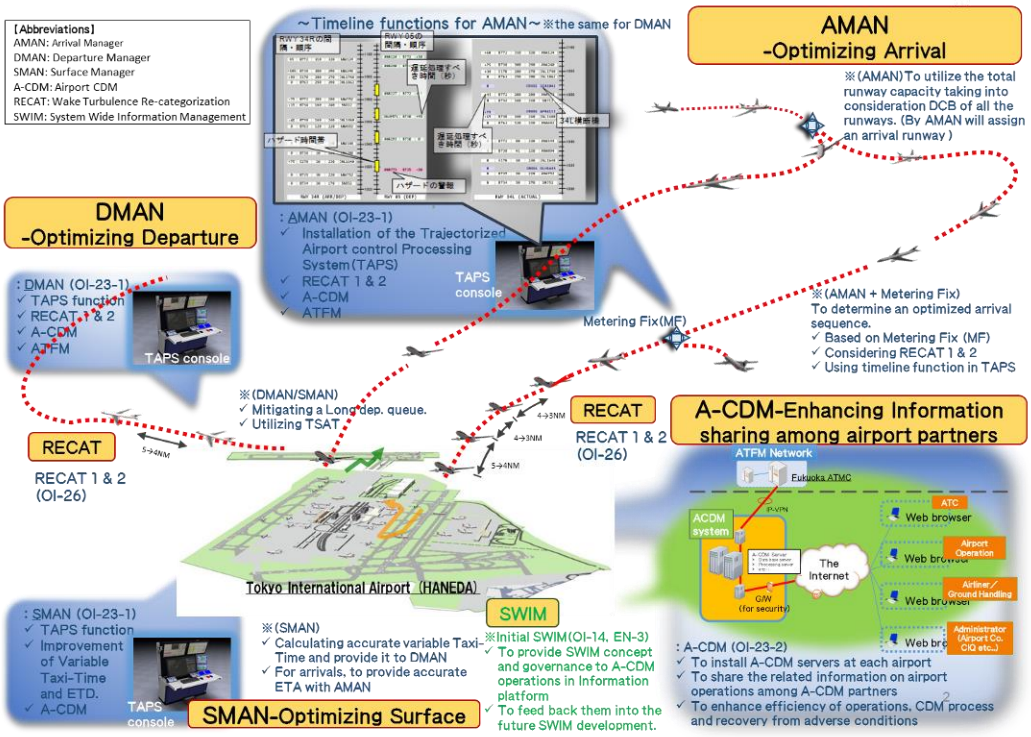
2.1.2 Furthermore, JAPAN has been scrutinized GANP policy, the ASBUs and Technology Roadmap, and reviewed CARATS roadmap, if necessary, for harmonized deployment along with global trend.

2.2 <u>The main measures in CARATS</u>

a) Improved efficiency in ATC operations of take-offs, landings and surface

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

Furthermore, some CARATS measures are implemented to improve operations for the Metropolitan airports, which are time-based metering at merging points, improved efficiency of aerodrome operations (AMAN/DMAN/SMAN), Airport Collaborative Decision Making (A-CDM), reduced wake turbulence separation minima (RECAT: Recategorization) etc. Each measure will also start the operation from around 2019 before when the Olympic and Paralympic Games held in Tokyo in 2020, in a phased manner where necessary.

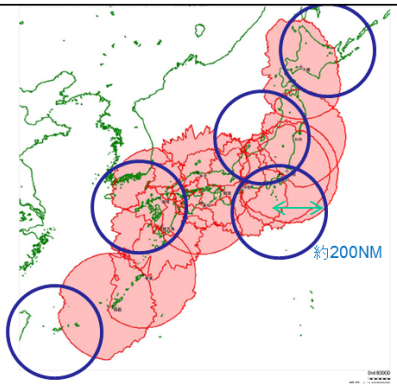


CARATS challenge for 2020 in Metropolitan Airports (For the Tokyo Haneda Airport)

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

In order to improve the processing capacity of ATC, Continental Controller Pilot Data Link Communication (Continental CPDLC) will also start. By transmitting non-time-critical ATC instruction/clearance as pre-fixed format through the data link in the domestic en-route airspace, ATC processing capacity will be expanded and human error risk will be reduced.

Consideration for coverage of Continental CPDLC



●Service area of existing DSP
○Area requested to provide additional facility

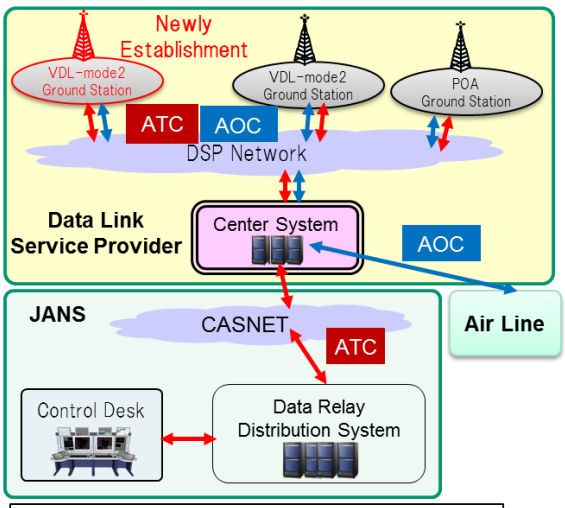


Image for service form of Continental CPDLC

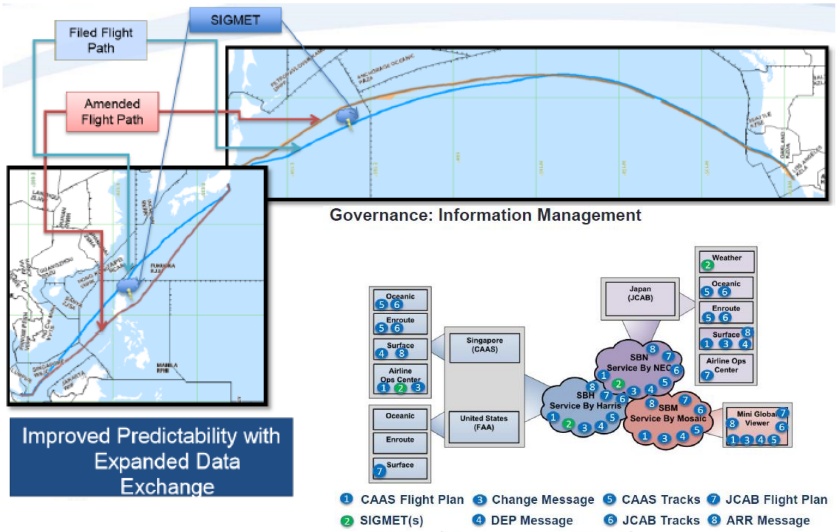
Continental Controller Pilot Data Link Communication (Continental CPDLC)

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

In order to implement the measures on Information-Sharing for Collaborative Decision-Making (CDM), 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 CDM.

The implementation of SWIM also aims to improve 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.

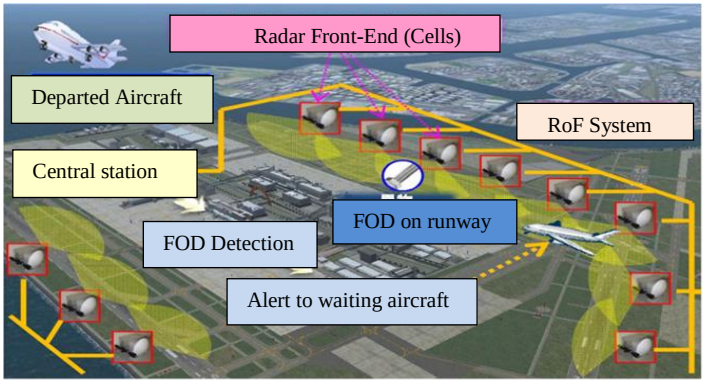


Scenario for Trans-Pacific Operations (SIN-NRT-LAX) in Mini Global Demonstration II

d) Foreign Object Debris detection system

Introduction of a system to detect foreign objects on the runway is expected to contribute to avoid aircraft accidents, it will reduce searching time of foreign objects and consequent runway-close time. ENRI has conducted demonstrations of the Foreign Object Debris (FOD) detection system since 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.

For this achievement, ENRI collaborated with University of Nice Sophia Antipolis, France and Vietnam National University, Ho Chi Minh City, Viet Nam.



Foreign objects can be detected by radars and cameras system set on the side of airport runways

In Japan, ENRI carries out R&D for the system which detects foreign objects with radar and confirms them with cameras.

Foreign Object Debris detection system image

2.3 Decision-making and arrangement in the last fiscal year

2.3.1 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 climb operation
- Detection of conflicts by a high-precision orbit monitoring, suggestion of its resolution advisory
- Introduction of current Departure Clearance (DCL) system in regional airports
- Optimization of RAIM prediction and GNSS performance monitoring

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

— END —