

THE FOURTH MEETING OF THE ALLPIRG ADVISORY GROUP

(Montreal, 6 - 8 February 2001)

Agenda Item 2.1: Interregional coordination and harmonization mechanism – Harmonization of air navigation systems

JCAB MTSAT FUNCTIONS AND CURRENT STATUS

(Presented by the Civil Aviation Bureau, Japan)

SUMMARY

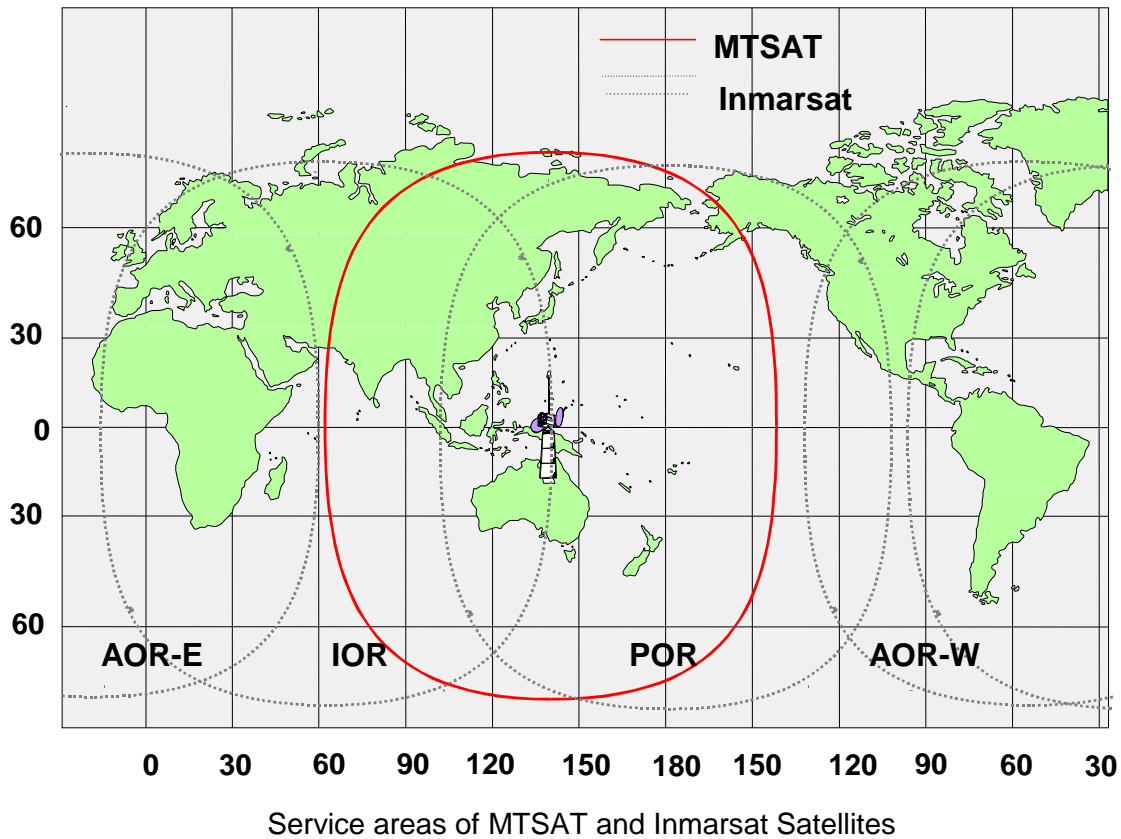
Civil Aviation Bureau Japan (JCAB) has decided to implement the ICAO CNS/ATM systems for Japan, centering on Multi-functional Transport Satellite (MTSAT), which will provide the aeronautical mobile satellite service (AMSS) and satellite-based augmentation system (SBAS) capabilities for ATS providers and aircraft operators in the Asia/Pacific Region. This paper provides the functions of JCAB MTSAT and the current status.

1. INTRODUCTION

1.1 In 1994, the Council for Civil Aviation, a consultancy body for the Minister of Transport, forecasted that air traffic in the North and Central Pacific (NOPAC and CENPAC) in 1992 would double by 2000 and triple by 2010. The Council considered that the existing air navigation systems could not cope with the increasing NOPAC and CENPAC traffic, and that new air navigation systems, based on satellite technology, should be implemented for Japan to cater to the future traffic in Japan and the adjacent airspace. The Council also considered that in order to make the air navigation systems safer and more reliable, sufficient system redundancy was required. The Council recommended, therefore that a new aeronautical satellite should be launched and the air navigation systems should be implemented centering on such a new satellite in order to ensure the systems safer and more reliable.

1.2 According to recommendations developed by the Council, JCAB has decided to launch a new aeronautical satellite, integrating aeronautical mission into the meteorological observation mission of the geo-stationary meteorological satellite, which is being utilized for providing meteorological information to the Asia/Pacific States since the 1970s. JCAB considered that a new satellite should be

designed to be widely utilized for aircraft operators and ATS providers in the Asia/Pacific Region in addition to the existing satellites. This new satellite is known as Multi-functional Transport Satellite (MTSAT).



2. MTSAT SYSTEM

2.1 MTSAT has two missions, i.e. meteorological mission and aeronautical mission. The aeronautical mission of MTSAT will contribute to each element of the ICAO CNS/ATM systems, i.e. communication, navigation and surveillance.

2.2 The MTSAT system will provide direct controller-pilot communication in voice (SAT-Voice) and data (controller-pilot datalink communication: CPDLC), GPS augmentation information, and automatic dependant surveillance (ADS) capabilities. The MTSAT system will not only be capable of handling oceanic ATS communications within the Japanese FIRs, but will also be offered to the civil aviation community in the Asia/Pacific Region as an aviation infrastructure, which could facilitate the implementation of the ICAO CNS/ATM systems.

2.3 In order to provide service continuously, even in natural disasters, two aeronautical satellite centers have been implemented at two different locations in Japan, i.e. Kobe (approximately 500 km west of Tokyo) and Hitachi-ota (approximately 100 km northeast of Tokyo).

3. **AMSS FUNCTIONS OF MTSAT**

3.1 The aeronautical mobile satellite services (AMSS) functions of MTSAT include the provision of all the aeronautical communications defined by ICAO, i.e. air traffic services (ATS), aeronautical operational control (AOC), aeronautical administrative communications (AAC), and aeronautical passenger communications (APC). These communication services could be available for ATS providers and aircraft operators in the Asia/Pacific Regions through data link service providers. Direct access to MTSAT could also be possible through implementation of dedicated ground earth station (GES) in some States.

3.2 Following the system evaluation and staff training for the MTSAT system, the AMSS functions of MTSAT will become operational in Japanese fiscal year 2003.

4. **MTSAT SATELLITE-BASED AUGMENTATION SYSTEM (MSAS)**

4.1 MTSAT satellite-based augmentation system (MSAS) is a satellite-based augmentation system (SBAS), equivalent to the United States WAAS and European EGNOS. MSAS provides aircraft with GPS augmentation information to satisfy navigation performance requirements, i.e. integrity, continuity and availability requirements, which are essential to the use of GPS for aircraft operation as a sole means of navigation.

4.2 The Asia/Pacific States could implement SBAS by using MTSAT, i.e. MSAS. It would also be possible for the Asia/Pacific Regions to implement SBAS by the Inmarsat system, e.g. WAAS, EGNOS. In order to provide aircraft with sufficient GPS augmentation information, both MSAS and other SBASs (WAAS, EGNOS) will require a certain number of ground monitor stations (GMS). The number and location of GMS required for each State will depend on the requirements for level of navigation services and reception of GPS.

4.3 JCAB has implemented the MTSAT monitoring and ranging stations (MRS) in Australia and Hawaii, four GMSs and two master control stations (MCS) in Japan. For this reason, the Asia/Pacific States could implement MSAS with a lower number of GMSs than other SBASs. Since most of the Asia/Pacific Regions will be covered by two MTSATs, the integrity and availability are higher than other SBASs within the Asia/Pacific Regions.

4.4 While each SBAS (WAAS, EGNOS and MSAS) is independent from the others, in order to ensure seamless SBAS services to the world, JCAB has been participating in the SBAS Technical Interoperability Working Group (IWG) established with the United States, Europe and Canada since 1997. The MSAS has been designed to be interoperable with the U.S. WAAS and European EGNOS at the signal-in-space level. Therefore, common navigation avionics can be used for the three SBAS systems.

4.5 Following the total system integration test of MTSAT and certification work of MSAS, MSAS will commence its first phase of operation by a single MTSAT in Japanese fiscal year 2004. The second phase of operation by two MTSATs is scheduled for commissioning in Japanese fiscal year 2006.

5. STATUS OF MTSAT

5.1 MTSAT-1 is being manufactured, and it will be launched in early 2003. A contract to manufacture MTSAT-2 has also been made. MTSAT-2 will be launched in the summer of 2004. The aeronautical missions of each MTSAT are designed to have a service life of ten years, and additional MTSATs will be launched at a regular interval to replace existing MTSATs. Consequently, the MTSAT system will be maintained in a dual operation, including satellites and ground systems, for the foreseeable future.

6. CONCLUSION

6.1 The AMSS functions of MTSAT will become operational in Japanese fiscal year 2003. MSAS will commence its initial operation in Japanese fiscal year 2004.

6.2 The MTSAT system has been designed to meet the ICAO SARPs and is interoperable with the existing satellite system. Two MTSATs will cover airspace throughout most of the Asia/Pacific Regions. The MTSAT system will offer an opportunity for ATS providers and aircraft operators in the Asia/Pacific Regions to have highly reliable communication, navigation and surveillance systems.

6.3 JCAB, as a government ATS provider, offers the MTSAT system to the Asia/Pacific States on a non-profit basis, as an aviation infrastructure for supporting implementation of the ICAO CNS/ATM systems.

7. ACTION BY THE MEETING

7.1 The fourth meeting of the ALLPIRG/Advisory Group is invited to note the information contained in this paper.