

**Agenda Item 3. CNS/ATM within AESAN**

**New CNS/ATM Systems Development Project in the Philippines**

Presented by the Philippines

**SUMMARY**

This paper provides information on the New Communication, Navigation, Surveillance and Air Traffic Management (CNS/ATM) Systems Development Project in the Philippines. The project covers the establishment of priority elements of the new satellite-based CNS/ATM systems at selected airport and sites, nationwide, the completion of which is expected in the first quarter of 2009.

**1. INTRODUCTION**

1.1 The Air Transportation Office (ATO), the civil aviation authority in the Philippines, under the Department of Transportation and Communications, in conformity with the requirement of the Global Air Navigation Plan for the CNS/ATM Systems and the Asia/Pacific Regional Plan for the New CNS/ATM Systems, is implementing the New Communication, Navigation and Surveillance/Air Traffic Management (CNS/ATM) Systems Development Project. The purpose of this project is to develop a dynamic and integrated CNS/ATM Systems, using satellite technology, to enhance safety, reliability and efficiency of air traffic and airspace systems in the Philippines.

1.2 The Detailed Design (D/D), which was started in June 2002 and will be completed by August 2003, is being undertaken by the Aviation Systems Consultants (ASCO) in association with Nippon Koei Co., Ltd. under grant assistance from Japan International Cooperation Agency (JICA). Project implementation is funded under the 25<sup>th</sup> Yen Loan Package (PH-P228) of the Japan Bank for International Cooperation (JBIC) in the amount of Japanese Yen 22,049.00 million, with an interest rate of 2.2% per annum and a repayment period of 30 years, including a 10-year grace period. The CNS/ATM system elements are to be commissioned during the 1<sup>st</sup> Quarter of 2009.

**2. SCOPE OF PROJECT.** The project will be implemented in five (5) years, covering the following components:

**2.1 ATM Automation.** The Manila ATM Center will, among others, combine the Manila ACC, Mactan Sub-ACC and all Approach Control Units, including the following:

2.1.1 Construction of Manila ATM Center Building (approx. 3,864 m<sup>2</sup>, 2-storey, RC structures) and Power Plant Building (approx. 660m<sup>2</sup>, 1-storey, RC structures).

2.1.2 Installation of an ATM Automation System consisting of Air Traffic Management function, Safety Measure function, Weather information analysis and display function, ATM data recording, and Controller's training and Back-up functions.

2.1.3 Provision of an AIS Database at Manila ATM Center and installation of twenty-three (23) sets of AIS terminals at major airports.

**2.2 Communication.** A redundant Wide Area Network (WAN) system will serve as the nerve center of the ATM system, consisting of combination of landlines, very small aperture terminal (VSAT) links, microwave links, and digital VHF links.

2.2.1 Installation of one (1) set of Voice Switching and Control System (VSCS) for air-ground voice communications and ATS direct speech circuits.

2.2.2 Installation of one (1) set of Data link Automated Terminal Information Service (D-ATIS) database at Manila ATM Center, and installation of eight (8) sets of D-ATIS terminals, VHF transmitters and receivers at international airports (includes alternate international airports).

2.2.3 Installation of an ATS Message Handling System (AMHS) at Manila ATM Center to exchange ATS message.

2.2.4 Replacement and/or addition of sixteen (16) and six (6) sets of VHF radio communication system for en-route and terminal operations, respectively.

2.2.5 Replacement of eight (8) microwave links for voice and data transmission.

2.2.6 Installation of one (1) Very Small Aperture Terminal (VSAT) hub station at Manila ATM Center and twenty-eight (28) VSAT remote stations at remote site and airport.

**2.3 Navigation.** The main navigational feature in this project is the introduction of Satellite-Based Augmentation System (SBAS) through the extension of the Japanese MSAS navigational services to the Philippines airspace.

2.3.1 Installation of three (3) Ground Monitor Stations (GMS) at Manila ATM Center, Davao airport and Puerto Princesa airport, which will be linked to the Master Control Stations (MCS) in Japan.

2.3.2 GMS Selection Analysis

2.3.2.1 A Service Volume Model (SVM) tool, a computer model that estimates availability of SBAS flight operations, was used to estimate availability of particular flight operations for each user location in the area of interest under the following assumptions:

- i. Base condition is MSAS with 2 MTSATs and 8 GMSs/MRSs
- ii. All results are based on an assumption that GPS and MTSAT satellite outages and restorations occur according to certain probabilities; that long-term outages requiring the launch of a replacement satellite, and short-term outages that can be recovered by switching to a redundant element on the satellite.
- iii. All GMS and Data Link elements are assumed to be working 100%.
- iv. The algorithms of MSAS processing is the MSAS Phase 2 algorithms.
- v. SBAS user equipment is assumed to be Class 1 user equipment that supports oceanic and domestic en-route, terminal, non-precision approach, and departure operation.

2.3.2.2 En-route. The result of the SVM analysis indicates that without installing a GMS in the Philippines, the estimated availability for en-route flight using MSAS Phase 2 (with 2 MTSATs) in the Philippines is estimated to exceed 0.99999 in southeastern Philippines and to be between 0.9999 and 0.99999 in the rest of the Philippines. When two or three GMSs are installed (one at Manila and another at either Puerto Princesa or Davao), then estimated en-route availability also exceeds 0.99999 throughout the Philippines. En-route availability is not likely to be sensitive to the exact location of the two GMSs. If only one GMS is installed at Manila, then en-route availability appears similar to but slightly better than if there are no GMS in the Philippines.

2.3.2.3 Non-Precision Approach (NPA). The result of the SVM analysis indicates that without installing a GMS in the Philippines, the estimated availability for NPA using MSAS Phase 2 is estimated to be between 0.999 and 0.9999 throughout the Philippines. When two or three GMSs are installed (one in Manila and another at either Puerto Princesa or Davao), then estimated NPA availability is between 0.9999 and 0.99999. If only one GMS exists or is working, estimated NPA availability is between 0.999 and 0.9999 throughout the Philippines (except for a very small area in central southeastern Philippines where it exceeds 0.99999).

2.3.2.4 The table below summarizes the SVM analysis under different conditions. It is shown that SBAS Availability in the Manila FIR, using MSAS of Japan with 3 GMS in the Philippines, is more than 0.99999 and between 0.9999 and 0.99999 for en-route and NPA, respectively. Furthermore, our neighboring countries in Southeast Asia will get the same Availability figures because of the three GMS.

No. of GMS	Result of SVM Analysis
NPA:	
No GMS	-0.999-0.9999 Availability will be achieved in Manila FIR
1 GMS	-No specific improvement from No GMS except in the eastern part of Samar Is. which improved to 0.9999-0.99999
2 GMS	-0.9999-0.99999 Availability will be achieved in Manila FIR except the southern ocean of Mindanao which will have 0.999-0.9999
3 GMS	-0.9999-0.99999 Availability will be achieved in the whole of Manila FIR
En-Route:	
No GMS	-More than 0.99999 Availability will be achieved in the eastern half of the Manila FIR and 0.9999-0.99999 in the western half of Manila FIR
1 GMS	-No specific improvement from No GMS
2 GMS	-More than 0.99999 Availability will be achieved in Manila FIR
3 GMS	-More than 0.99999 Availability will be achieved in Manila FIR

## 2.4 Surveillance

2.4.1. Provision of a consolidated Automatic Dependent Surveillance (ADS) function in the ATM Automation System at Manila ATM Center.

2.4.2. Replacement of Tagaytay en-route SSR, and installation of three (3) en-route SSRs at Palawan, Zamboanga and Davao (or Northeastern Luzon).

## 2.5 Meteorological System

2.5.1. Installation of a WAFS Data Receiving System, including VSAT equipment at ATM Center.

2.5.2 Installation of an MTSAT weather receiver and antenna at the ATM Center.

2.5.3 Provision of an En-route Weather Data Receiving System, including installation of interface equipment with ADS and CPDLC and workstation-based network equipment for data storage and management at the ATM Center.

2.5.4 Installation of a Weather Data Storage and Display System in the Manila ATM Center.

**3. PHYSICAL STATUS.** The Detailed Design is 40% complete as of 28 February 2003.

**4. PROJECT SCHEDULE.** The project implementation schedule is as follows:

4.1 Selection of Consulting Firm for the construction supervision: March 2004-February 2005 (12 months)

4.2 Consulting Services for construction supervision: Mar 2005-Mar 2010 (61 months)

4.3 Selection of Contractor: Mar 2005-Sept 2006 (19 months)

- ◆ Review of D/D, Final Tender Document, Pre-Qualification (incl. JBIC's concurrence): Mar 2005-Sept 2005 (7 months)
- ◆ Issuance of RFP, Opening of Bids, Evaluation of Technical/Financial Proposals (incl. JBIC's concurrence): Oct 2005-May 2006 (8 months)
- ◆ Contract Negotiation: June 2006-July 2006 (2 months)
- ◆ Signing of Construction Contract including JBIC's concurrence: Aug 2006 (1 month)
- ◆ L/C Opening: Sept 2006 (1 month)

4.4 Construction Works: Oct 2006-Mar 2009 (30 months)

- ◆ Construction of ATM Center: Oct 2006-Mar 2008 (18 months)
- ◆ Equipment Manufacturing and Installation: Oct 2006-Nov 2008 (26 months)
- ◆ Adjustment and reliability test: Dec 2008-Mar 2009 (4 months)

4.5 Defects Liability Period: April 2009-Mar 2010 (12 months)

**5. ACTION BY THE MEETING.** The Meeting is invited to note the information in this paper.

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