



International Civil Aviation Organization

**THE EIGHTH MEETING OF AERONAUTICAL  
TELECOMMUNICATION NETWORK (ATN)  
IMPLEMENTATION CO-ORDINATION GROUP  
OF APANPIRG (ATNICG/8)**



Ministry Of Transportation  
Republic of Indonesia

Jakarta, Indonesia, 18 - 21 March 2013

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**Agenda Item 6: Report of IMS/SWIM Sub-Group on regional SWIM implementation objective and IMS roadmap including cost-benefit analyses**

**CHINA SWIM INITIATIVES**

(Presented by China)

**SUMMARY**

This information paper presents SWIM initiatives in China.

This paper relates to –

**Strategic Objectives:**

A: *Safety – Enhance global civil aviation safety*

C: *Environmental Protection and Sustainable Development of Air Transport – Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment*

**Global Plan Initiatives:**

GPI-18 Aeronautical information

GPI-19 Meteorological Systems

GPI-22 Communication infrastructure

**1. INTRODUCTION**

1.1 Under ICAO GANP(4<sup>th</sup> edition of Doc 9750)/ASBU plan, Globally Interoperable Systems and Data - Through Globally Interoperable System Wide Information Management(SWIM), is one of key Performance Improvement Areas. A global SWIM concept for air traffic management operations and related provisions are under development. States are encouraged to work to demonstrate how SWIM capabilities and functions will meet the needs of the future air traffic management system.

1.2 According to the Asia/Pacific seamless ATM draft plan of ICAO, three major areas of Seamless ATM Principles has been identified, including People (human performance), Facilities (physical equipment), Technology and Information. Several principles on these areas have been defined.

1.3 Considering the rapid air traffic growth in China and Asia/Pacific region, China has launched some researches to meet the challenges faced by current ATM systems. Initial SWIM Study Project is one of projects of China Civil Aviation Collaborative ATM Technology Program, funded by Ministry of Science and Technology (MOST) and Civil Aviation Administration of China (CAAC). It is a four-year research project started in 2011. The project aims to study and evaluate SWIM concept and key technologies, propose Information Management Infrastructure for next generation ATM system in China, prototype and demonstrate initial SWIM capabilities.

1.4 The preliminary data concept models derived from AIXM, WXXM and FIXM for information sharing and exchanging among ATSUs, airlines and airports have been built with UML. The function architecture of SWIM has been designed according to the SOA architecture principles. With the research of integration technology candidates such as Web Service, MOM and ESB, initial system architecture have been developed and evaluated. A test system was deployed in Beijing Capital International Airport for further assessment.

1.5 The paper highlights some considerations when planning and implementing SWIM at state or regional level, based on China's two-year study on SWIM and related technologies.

## **2. DISCUSSION**

### **2.1 Common network and IT security infrastructure**

From technical point of view, SWIM is a virtual ATM information pool consists of communication networks, IT infrastructure including products and middleware that support ATM applications through standardized service interfaces. Upon China's experience, a common wide area IP-based network is an essential element to support the system wide information pool and applications. The information security infrastructure like PKI is also necessary for secure information accessing across distributed systems. To support future ATM applications and SWIM, China is planning to upgrade the domestic G/G data communication network extending its coverage and supporting more IP-based communication.

### **2.2 Messaging in Service oriented Architecture(SOA)**

To achieve stability and flexibility of information environment, China's study team has proposed SOA as an architectural paradigm for China's future SWIM. SOA is an architectural style that modularizes information systems into services which can be collected to implement business process. User applications can access information that is required by calling appropriate services provided by service provider applications.

However, most of current ATM systems in China interact with each other based on AFTN messages or proprietary protocols. To benefit these systems at the early stage of SWIM implementation, messaging and information security are identified as two high priority core services to be provided by initial SWIM system. Modern messaging technologies and products have been evaluated and Enterprise Service Bus (ESB) with integrated Messaging Oriented Middleware (MOM) has been selected as a major mean to provide initial SWIM core services. It is based on the understanding that interoperability of existing ATM systems can be improved by implementing an enhanced messaging system. As the whole system evolve, it will support more communication patterns such as request-reply interaction needed by future service oriented ATM applications. Then other appropriate services such as Service Interface Management service will be incorporated into SWIM core services.

It is recognized the operational concept of China’s initial SWIM, especially its core messaging service is to be defined. Comparing to existing AFTN and AMHS messaging handling system, the responsibilities of SWIM messaging service might be changed, for example, whether messaging service or message sender takes the responsibility of detecting message handling failure and recovering the progress. Different definitions might lead to different system design and different cost of technical solution.

2.3 ATM business processes

The purpose of SWIM is to support ATM business processes. SWIM architecture design needs a deep understanding of business processes in each ATM area, working closely with ATM domain experts are necessary from the beginning of project.

Furthermore, SWIM is an information platform serving to next generation global ATM system described in ICAO Doc9854, its processes varies greatly with level of maturity. It needs to pay attention to the development of next generation ATM system. Since we cannot look into the future systems in details, despite the best efforts, some structural or functional changes may be required. To enable the graceful introduction of such changes, the design of initial SWIM system needs to allow the simultaneous deployment of multiple versions of service interfaces.

2.4 Technical Standards

Technical standards are important for SWIM system enabling interoperability. There are two kinds of SOA standards available for SWIM planning and implementing. Technology standards focused on middleware products enable interoperability, while SOA architecture standards provide guidance to customers as they design and deploy SOA solutions with industry validated methodologies and terminology. Some organizations have been involved in standard development, including W3C, OASIS, Open Group, IEEE etc. Currently, many standards are available at different maturity levels while new ones are under development. It is necessary to select and customize the standards to be used in SWIM environment.

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to note the SWIM initiatives in China.

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