



International Civil Aviation Organization

The Fifth Meeting of ICAO Asia/Pacific Air Traffic Flow Management Steering Group (ATFM/SG/5)

Bangkok, Thailand, 30 March – 03 April 2015

Agenda Item 5: Development of Regional ATFM Framework

FRAMEWORK – PRELIMINARY SECTIONS

(Presented by the Secretariat)

SUMMARY

This paper presents the preliminary sections of the Draft Asia/Pacific Framework for Collaborative ATFM, for review by the ATFM/SG.

1. INTRODUCTION

1.1 The structure of the Draft Asia/Pacific Regional Framework for Collaborative ATFM is aligned with that of the Asia/Pacific Seamless ATM Plan.

2. DISCUSSION

2.1 The preliminary sections of the Draft Framework include:

- Scope;
- Development and Objectives;
- Executive Summary; and
- Abbreviations and Acronyms

2.2 Abbreviations and acronyms for ATFM-specific terminology developed for the Framework are listed separately in an appendix to Section 5, Background Information - Terminology and Communications.

2.3 The preliminary sections are provided at Attachment A for review by the meeting.

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.

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ATTACHMENT A – Framework Preliminary Sections: Scope of the Framework, Development and Objectives, and Executive Summary

SCOPE OF THE FRAMEWORK

Regional Air Traffic Flow Management

1.1 The 24th Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/24), held in June 2013, considered that with the strong growth of air traffic in the Asia Pacific Region there was a need to effectively manage demand and capacity, particularly at major international air hubs and in the associated major traffic flows (MTF).

1.2 The airspace of the Asia/Pacific Region, particularly that of South East Asia, is characterized by relatively small FIRs with corresponding low flight transit times. Any demand management process applied unilaterally in one FIR had a knock-on effect in multiple ‘downstream’ FIRs, and procedures applied are therefore structured around the lowest capability along any particular route/flow. ‘Flow Management’ in the region has tended to be limited to rudimentary traffic spacing measures imposed by individual FIRs, rather taking a wider network view that optimizes available capacity and manages demand, only when necessary, on a sub-regional basis.

1.3 The Asia/Pacific Seamless ATM Plan provides a blueprint for coordinated Regional development, including capability improvements described in the ICAO Aviation System Block Upgrades (ASBU) roadmap. Air Traffic Flow Management (ATFM) taking a network view, is a key module in ASBU Block Zero. **B0-NOPS – Improved Flow Performance through Planning based on a Network-Wide view** has since been identified by APANPIRG as one of ten priorities for the Asia/Pacific Region.

1.4 While the concept of a single ATFM entity to serve a region works well in Europe and North America, a centralized ATFM Unit (ATFMU) approach is not yet practicable for the Asia/Pacific region. The need for a regional ATFM framework focusing on sub-regional, multi-State implementation, rather than individual FIR-based programs, was recognized by APANPIRG/24 in its adoption of the following Conclusion:

Conclusion 24/15: Asia/Pacific ATFM Steering Group

That, States participate in, and support the Asia/Pacific ATFM Steering Group to develop a common Regional ATFM framework, which addresses ATFM implementation and ATFM operational issues in the Asia/Pacific region.

1.5 This document, the *Asia/Pacific Region Framework for Collaborative ATFM* (the Framework) is intended to provide a common Regional framework that addresses ATFM implementation and ATFM operational issues in the Asia/Pacific region. Further discussed in later sections, a core concept of the Framework is *Distributed Multi-Nodal ATFM*, envisaged as a virtual ATFM platform of interconnected States and/or sub-Regional groups operating in an ATFM network without the need for any central, physical facility providing the network management function. The concept, untried elsewhere, is in the early stages of its development. The Framework will, in its future versions, be expanded and adjusted where necessary as the concept matures and experience is gained from operational implementation of cross-border, network-based ATFM and its supporting technology.

1.6 Doc 9971 states that *in its initial application, ATFM need not involve complicated processes, procedures or tools. The goal is to collaborate with system stakeholders and to communicate operational information to airspace users, air navigation service providers, and to*

other stakeholders in a timely manner. Version 1.0 of the Framework includes near to medium term performance objectives to prepare and guide States in the implementation of collaborative, cross-border ATFM, providing for regionally harmonized ATFM concepts, communications and practices.

Framework Structure

1.7 The Framework, developed by the Asia/Pacific ATFM Steering Group (ATFM/SG), forms part of a suite of global and regional air navigation planning documents relevant to the Asia/Pacific Region.

1.8 Global vision and strategy perspectives are provided by the *Global ATM Operational Concept* (Doc 9854), *Global Air Navigation Plan* (GANP, Doc 9750), and *Global Aviation Safety Plan* (GASP, Doc 10004). The GANP includes the Aviation System Block Upgrade (ASBU) framework, its Modules and its associated technology Roadmaps.

1.9 Beneath this level is regional planning primarily provided by the *Asia/Pacific Basic Air Navigation Plan* (BANP, Doc 9673) and the *Asia/Pacific Seamless ATM Plan* which, together with its contributory documents, including this Framework, define goals and the means of meeting State planning objectives.

1.10 Now incorporated within the Seamless ATM Plan are the *Asia/Pacific ATFM Concept of Operations* and *Air Navigation Concept of Operations*. The Framework draws upon and aligns with the guidance and recommendations of ICAO Doc 9971 *Manual on Collaborative ATFM*, and with the regional performance improvement expectations of the Seamless ATM Plan.

1.11 The Framework includes analysis of the current situation, a performance improvement plan, and considerations for research and future development.

Document Review

1.12 The Framework is intended, as a minimum, to be first reviewed coincident with the first planned review of the Seamless ATM Plan in 2016 and thereafter each three years, also coincident with the regular review of the Seamless ATM Plan. Earlier or more frequent review and amendment will be conducted as recommended by ATFM/SG and agreed by APANPIRG, through its Air Traffic Management (ATM) Sub-Group (ATM/SG).

DEVELOPMENT AND OBJECTIVES OF THE FRAMEWORK

Framework Development

2.1 The Asia Pacific Region Air Traffic Flow Management Steering Group (ATFM/SG) was formed by the Asia/Pacific Region Air Navigation Planning and Implementation Regional Group (APANPIRG) to *inter alia*, develop a common Regional ATFM framework which addresses ATFM implementation and ATFM operational issues in the Asia/Pacific Region.

2.2 The Framework was developed over four meetings of the ATFM/SG, supported by offline work by a team of specialists drawn from within the Steering Group. The Framework was endorsed by the 26th Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/26, Bangkok, Thailand, 7 to 10 September 2015).

2.3 The Framework draws on relevant experience gained in Asia/Pacific States, and in other Regions. Key concepts used or adapted in the Framework include:

- A distributed multi-nodal ATFM network or *virtual ATFM platform*, in place of the conventional centralized physical ATFM network management centre;
- An agreed model for ATFM information exchange;
- An agreed suite of ATFM terminologies for use in ATFM systems and processes, and in interfaces with other complementary systems;
- Meteorological forecasting products tailored for ATFM purposes; terminologies drawn from;
- *Delay absorption intent*, allowing aircraft operators to flexibly distribute their total ATFM delay across various phases of flight.

2.4 The performance objectives of the Framework are, wherever practicable, aligned with the ATFM-related objectives and implementation timelines of the Asia/Pacific Seamless ATM Plan. The

2.5 Further development of the Framework beyond this version will be guided by the concepts discussed in its Research and Future Development section, and by the experience gained in operational implementation and the maturing regional ATFM Concept.

ATFM Framework Objective

2.6 Having considered relevant documents such as the Global Air Navigation Plan (Doc 9750), the Asia/Pacific Region Seamless ATM Plan and the Manual on Collaborative Air Traffic Flow Management (Doc 9971), the objective of the Framework is to provide a regionally agreed framework for the harmonized implementation of networked, interoperable, multi-FIR, multi-State, cross-boundary collaborative ATFM capability.

2.7 The Framework provides information, guidance and performance objectives including:

- ATFM principles;
- ATFM-related Aviation System Block Upgrades (ASBU), and relevant performance objectives from the Asia/Pacific Seamless ATM Plan;

- ATFM-related performance objectives of the Asia/Pacific Seamless ATM Plan;
- Collaborative decision-making (CDM);
- ATFM phases;
- Airspace and airport capacity improvement, planning, assessment and declaration;
- ATFM daily plan;
- ATFM terminology, communications and information distribution;
- Meteorological products for ATFM;
- Asia/Pacific Region ATFM operational concept
- Training and competencies for ATFM personnel
- Analysis of current ATFM capability in the Region
- A performance improvement plan; and
- considerations for research and future development

EXECUTIVE SUMMARY

The Need for a Regional Framework for Collaborative ATFM

3.1 The Asia-Pacific (APAC) region is the world's largest market for air transport. In 2012 it accounted for 33% of the global air transport market¹. This was expected to grow to 37% by 2017. Three of the top ten airports (passenger movements) and four of the top ten (air cargo tonnage) in 2013 were in the Asia/Pacific Region².

3.2 While recognizing that the first response to increased demand should always be an increase in capacity, the growing demand/capacity imbalance in the Region has resulted in increasing congestion, delays, costs and potential safety risks.

3.3 The need for a regional, network-based response to the challenges of increasing demand was recognized by APANPIRG/24 (June 2013) in its adoption of **Conclusion 24/15: Asia/Pacific ATFM Steering Group**, re-convening the ATFM/SG to develop a common Regional ATFM framework addressing ATFM implementation and ATFM operational issues in the Asia/Pacific Region. It was further recognized in the inclusion of the ASBU module **B0-NOPS – Improved Flow Performance through Planning based on a Network-Wide View** among the ten priorities and targets for the Asia/Pacific Region³.

3.4 The scope of work of the ATFM/SG was further expanded by new terms-of-reference, endorsed by APANPIRG/25 (September 2014), which require the Steering Group to research and recommend appropriate ATFM guidance, and maintain an overview and review the effectiveness of Asia/Pacific CDM/ATFM programs.

Interoperability is the Key

3.5 The Regional ATFM Concept takes into account the ATFM development initiatives undertaken by various States to balance demand and capacity within their airspaces. Recognizing the need to adopt a network wide view for improving the flow performance across the APAC region, the Regional ATFM concept has been developed in line with ATM performance improvement elements of Asia Pacific Seamless ATM Plan.

3.1 Of central importance to Framework is the concept of cross border ATFM utilizing a distributed multi-nodal ATFM network. Previously untried, the concept as detailed in this document will develop further with experience gained, particularly in the ongoing multi-partite trial program, with operational trials planned to commence in June 2015. This program, with the active participation of 8 Asia/Pacific Region administrations and 2 international organizations, is expected to contribute significantly to the knowledge and experience necessary for the ongoing work of ATFM/SG and the further development of the regional ATFM framework.

¹ IATA Asia/Pacific Region ATFM Study 2014

² Airports Council International (ACI) 2013 World Airport Traffic Report

³ Conclusion APANPIRG 25/2 – APAC Regional Air Navigation Priorities and Targets

3.2 A key consideration in the development of Version 1 of the Regional Framework for Collaborative ATFM was the interoperability of systems, procedures and practices to ensure not only regionally harmonized ATFM, but also the effective, complementary operation of other systems forming part of the gate-to-gate chain of air traffic management. It is vital that all systems and processes use common information, terminology and communications protocols to ensure common understanding and optimal outcomes. In particular, the interoperability of ATFM, Airport Collaborative Decision-Making (A-CDM), Arrival Manager (AMAN) and Departure Manager (DMAN) systems, and airspace user and ATM automation system interfaces, is critical to the success of a regional ATFM program and the optimized use of available capacity. ATFM/SG addressed these issues in the development of harmonized ATFM terminology and the specification of automated system communications protocols, and through its linkage to the ICAO Asia/Pacific Region Aerodromes Operations and Planning Working Group (AOP/WG).

Regional ATFM Concept

3.3 Of central importance to Framework is the concept of a cross-border ATFM utilizing a distributed multi-nodal ATFM network. Previously untried, the concept as detailed in this document will develop further with experience gained, particularly in the ongoing multi-partite trial program, with operational trials planned to commence in June 2015. This program, with the active participation of 8 Asia/Pacific Region administrations and 2 international organizations, is expected to contribute significantly to the knowledge and experience necessary for the ongoing work of ATFM/SG and the further development of the regional ATFM framework.

ABBREVIATIONS and ACRONYMS

Abbreviations and Acronyms

Note: Abbreviations and acronyms for ATFM-specific terminology developed for the Asia/Pacific Regional Framework for Collaborative ATFM are listed separately in an appendix to Section 5, Background Information - Terminology and Communications.

AAR	Aerodrome Arrival Rate or Airport Acceptance Rate
ATM	Air Traffic Management
ABI	Advanced Boundary Information (AIDC)
ACAS	Airborne Collision Avoidance System
ACC	Area Control Centre
ACP	Acceptance (AIDC)
ADOC	Aircraft Direct Operating Cost
ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C	Automatic Dependent Surveillance-Contract
AIDC	ATS Inter-facility Data Communications
AIGD	ICAO ADS-B Implementation and Guidance Document
AIM	Aeronautical Information Management
AIRAC	Aeronautical Information Regulation and Control
AIRD	ATM Improvement Research and Development
AIS	Aeronautical Information Service
AIXM	Aeronautical Information Exchange Model
AMAN	Arrival Manager
ANSP	Air Navigation Service Provider
AN-Conf	Air Navigation Conference
AOC	Assumption of Control (AIDC)
AOM	Airspace Organization and Management
APAC	Asia/Pacific
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Regional Group
APCH	Approach
APEC	Asia Pacific Economic Cooperation
APSAPG	Asia/Pacific Seamless ATM Planning Group
APV	Approach with Vertical Guidance
APW	Area Proximity Warning
ASBU	Aviation System Block Upgrade
ASD	Aircraft Situation Display
ASEAN	Association of Southeast Asian Nations
ASMGCS	Advanced Surface Movements Guidance Control Systems
ATC	Air Traffic Control
ATCONF	Worldwide Air Transport Conference
ATFM	Air Traffic Flow Management
ATIS	Automatic Terminal Information Service
ATS	Air Traffic Services
ATSA	Air Traffic Situational Awareness
ATM	Air Traffic Management
CANSO	Civil Air Navigation Services Organization
CARATS	Collaborative Actions for Renovation of Air Traffic Systems
CDM	Collaborative Decision-Making
CCO	Continuous Climb Operations
CDO	Continuous Descent Operations
CFIT	Controlled Flight into Terrain

CLAM	Cleared Level Adherence Monitoring
COM	Communication
CONOPS	Concept of Operations
CNS	Communications, Navigation, Surveillance
CPAR	Conflict Prediction and Resolution
CPDLC	Controller Pilot Data-link Communications
CPWG	Cross-Polar Working Group
CSP	Communication Service Provider
CTA	Control Area
CTR	Control Zone
DARP	Dynamic Airborne Re-route Planning
DGCA	Conference of Directors General of Civil Aviation
DMAN	Departure Manager
DME	Distance Measuring Equipment
EST	Coordinate Estimate
FAA	Federal Aviation Administration
FDPS	Flight Data Processing System
FIR	Flight Information Region
FIRB	Flight Information Region Boundary
FL	Flight Level
FLAS	Flight Level Allocation Scheme
FLOS	Flight Level Orientation Scheme
FRMS	Fatigue Risk Management System
FUA	Flexible Use Airspace
GANIS	Global Air Navigation Industry Symposium
GANP	Global Air Navigation Plan
GASP	Global Aviation Safety Plan
GBAS	Ground-based Augmentation System
GDP	Gross Domestic Product
GLS	GNSS Landing System
GNSS	Global Navigation Satellite System
GPI	Global Plan Initiative
HF	High Frequency
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IMC	Instrument Meteorological Conditions
INS	Inertial Navigation Systems
IO	International Organizations
IPACG	Informal Pacific ATC Coordinating Group
ISPACG	Informal South Pacific ATS Coordinating Group
ITP	In-Trail Procedure
KPA	Key Performance Area
LNAV	Lateral Navigation
LVO	Low Visibility Operations
MET	Meteorological
METAR	Meteorological Aerodrome Report
MLAT	Multilateration
MSAW	Minimum Safe Altitude Warning
MTF	Major Traffic Flow
NextGen	Next Generation Air Transportation System
OPMET	Operational Meteorological
OLDI	On-Line Data Interchange
OTS	Organised Track System
PACOTS	Pacific Organized Track System

PARS	Preferred Aerodrome/Airspace and Route Specifications
PASL	Preferred ATM Service Levels
PBN	Performance-based Navigation
PIA	Performance Improvement Areas
PKP	Passenger Kilometres Performed
PVT	Passenger Value of Time
RAIM	Receiver Autonomous Integrity Monitoring
RAM	Route Adherence Monitoring
RANP	Regional Air Navigation Plan
RPK	Revenue Passenger Kilometres
RNAV	Area Navigation
RNP	Required Navigation Performance
RVSM	Reduced Vertical Separation Minimum
SAARC	South Asian Association for Regional Cooperation
SATVOICE	Satellite Voice Communications
SAR	Search and Rescue
SBAS	Space Based Augmentation System
SCS	South China Sea
SESAR	Single European Sky ATM Research
SHEL	Software, Hardware, Environment and Liveware
SID	Standard Instrument Departure
SIGMET	Significant Meteorological Information
SPECI	Special Weather Report
STAR	Standard Terminal Arrival Route or Standard Instrument Arrival (Doc 4444)
STCA	Short Term Conflict Alert
STS	Special Handling Status
SUA	Special Use Airspace
SUR	Surveillance
SWIM	System-Wide Information Management
TAF	Terminal Area Forecast
TAWS	Terrain Awareness Warning Systems
TBO	Trajectory Based Operations
TCAC	Tropical Cyclone Advisory Centre
TCAS	Traffic Collision Avoidance System
TOC	Transfer of Control
UAS	Unmanned Aircraft Systems
UAT	Universal Access Transceiver
UPR	User Preferred Routes
VHF	Very High Frequency
VMC	Visual Meteorological Systems
VNAV	Vertical Navigation
VAAC	Volcanic Ash Advisory Centre
VMC	Visual Meteorological Conditions
VOLMET	Volume Meteorological
VOR	Very High Frequency Omni-directional Radio Range
VSAT	Very Small Aperture
WAFC	World Area Forecast Centre

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