INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

REPORT OF THE THIRD MEETING OF THE

AIR TRAFFIC FLOW MANAGEMENT TASK FORCE

(ATFM/TF/3)

Bangkok, Thailand, 6 – 9 September 2005

The views expressed in this Report should be taken as those of the Meeting and not of the Organization

Approved by the Meeting
and Published by the ICAO Asia and Pacific Regional Office

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History of the Meeting

Report on Agenda Items

Appendices

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1.1 Introduction

1.1.1 The Third Meeting of the Air Traffic Flow Management Task Force (ATFM/TF/3) was held at the Kotaite Wing of the ICAO Asia and Pacific Regional Office, Bangkok, Thailand from 6 to 9 September 2005.

1.2 Attendance

1.2.1 The meeting was attended by 20 participants from Australia, India, Malaysia, Singapore, Thailand and IATA. The meeting accepted apologies from Sri Lanka, and Qantas Airways as part of the IATA delegation. A complete list of participants is at **Appendix A** to this Report.

1.2.2 Pakistan had forwarded a written apology to the Regional Office, regretting their absence from the task force activities. However, they offered their support of the ATFM operational trial proposed by the task force for December 2005 and supported the publication of an AIC that included Pakistan as part of the trial arrangements.

1.3 Officers and Secretariat

1.3.1 Mr. Ron Rigney, ATM International Liaison Manager, Airservices Australia, continued as Chairman of the Task Force.

1.3.2 Mr. Andrew Tiede, Regional Officer ATM, ICAO Asia and Pacific Office, was Secretary of the meeting.

1.4 Opening of the Meeting

1.4.1 The meeting was opened by Mr. Andrew Tiede, who welcomed participants on behalf of Mr. L.B. Shah, Regional Director, ICAO Asia and Pacific Office. Mr. Tiede remarked that there had been a considerable investment made by States, International Organizations and the Regional Office over a number of years in regard to the flow management issues in the Bay of Bengal/Kabul FIR context.

1.4.2 Despite this, the flow management issues had still not been effectively addressed and Mr. Tiede urged this meeting to make every endeavour to ensure positive outcomes in this regard. The task force had been established by the Bay of Bengal ATS Coordination Group specifically to address flow management issues and this meeting would be the fifth task force related meeting in the nine months since the task force had been established by a special coordination meeting in January 2005. Mr. Tiede highlighted the significant costs to all parties in this respect and urged the meeting to ensure that best use was made of time and resources, noting that despite the evident work of the task force the proposed date for implementation of the ATFM operational trial had slipped from 29 September 2005 to 22 December 2005. Any further delay to the operational trial could be potentially damaging to the credibility of the task force.

1.4.3 Mr. Ron Rigney in his address welcomed the participants to the third meeting of the ATFM/TF and indicated that there were a number of matters which would need to be considered in order to assist with the planning of the ATFM Operational Trial which was expected to be implemented on 22 December 2005. In this regard, Mr. Rigney thanked the members of the ATFM/TF Core Team who had recently met in Singapore to progress matters ahead of ATFM/TF/3.

1.4.4 Mr. Rigney reflected on the significant events that had taken place within the Asia and Pacific regions in the weeks since the second Task Force meeting convened in Delhi. On behalf of the ATFM Task Force, Mr. Rigney expressed sincere sympathies and condolences to India, Indonesia and the United States of America for the loss of life under such tragic circumstances.

1.4.5 In looking to the future, Mr. Rigney noted that the work of the ATFM/TF had taken on even more significance, given the continued escalation of world oil prices and the impact that this was likely to have on international civil aviation.

1.5 **Documentation and Working Language**

1.5.1 The working language of the meeting as well as all documentation was in English.

1.5.2 Ten (10) Working Papers and five (5) Information Papers were presented to the meeting. A list of papers is included at **Appendix B** to this Report.

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Agenda Item 1: Adoption of Agenda

1.1 The meeting reviewed the provisional agenda proposed by the Secretariat, adopting the following agenda for the meeting.

Agenda Item 1: Adoption of Agenda

Agenda Item 2: Review outcomes of ATFM/TF/2 and SCM ATFM/TF PMT

Agenda Item 3: Flow Management Handbook

Agenda Item 4: Operational Trial Arrangements

Agenda Item 5: Safety Assessment

Agenda Item 6: Draft AIP Supplement

Agenda Item 7: Develop a Coordinated Plan for implementation of actions agreed by the Task Force

Agenda Item 8: Review and update ATFM/TF Task List

Agenda Item 9: Any other business

Agenda Item 10: Date and venue for the next meeting

Agenda Item 2: Review Outcomes of ATFM/TF/2 and SCM ATFM/TF PMT

2.1 The meeting reviewed the circumstances leading to the establishment of the ATFM/TF and the work undertaken since that time, recalling that APANPIRG/15 (August 2004) had noted the considerable efforts being made by States to collaborate together with IATA to improve the ATFM over the Bay of Bengal area and encouraged all parties to continue their efforts and to take into account the benefits to be derived from ATM automated systems.

2.2 The meeting acknowledged that significant effort had been invested by States, ICAO and International Organizations in respect of addressing the issues of ATFM over the Bay of Bengal. Difficulties in respect of traffic flows had been identified by the BBACG and RVSM/TF during 2003 and reported to APANPIRG/15 (August 2004). The matters were further addressed during RVSM/TF/24 in November 2004 and since that time, in addition to the ongoing work of the ATFM/TF core team, the following meetings had been held:

a) Special Coordination Meeting – Bay of Bengal (SCM-BOB), in conjunction with BBACG/16 during 31 January – 4 February 2005;

b) Informal Singapore 'Mini' Meeting of ATFM/TF, 14 & 15 March 2005;

c) First meeting of the Air Traffic Flow Management Task (ATFM/TF/1), in conjunction with Combined FIT – BOB & FIT - SEA during 18 to 22 April 2005;

d) Second Meeting of the Air Traffic Flow Management Task Force (ATFM/TF/2), 28 June to 1 July 2005.

e) Special Coordination Meeting of the Air Traffic Flow Management Task Force in respect of Establishing a Project Management Team (SCM ATFM/TF PMT), 10 & 11 August 2005.

Special Coordination Meeting – Bay of Bengal ATFM (SCM-BOB)

2.3 As a result of recommendations arising from the RVSM/TF, SCM-BOB had been held in conjunction with the BBACG/16. SCM-BOB concluded that a dedicated Air Traffic Flow Management Task Force (ATFM/TF) should be established under BBACG to progress the establishment of an ATFM and implementation of ATFM automated systems for the Bay of Bengal and South Asia traffic flows, and drafted terms of reference accordingly.

Informal Singapore 'mini' Meeting

2.4 In accordance with the request from SCM-BOB that discussions continue "off-line" in preparation for the ATFM/TF/1 meeting, an informal 'mini' working group meeting of several South East Asia ATFM/TF task force members and industry stakeholders was held during March 2005. The meeting commenced work on a draft framework for the proposed ATFM/TF activities to be considered by the full ATFM/TF/1 meeting in April 2005 and commenced planning for implementation of an ATFM operational trial on 29 September 2005.

First Meeting of the ATFM Task Force (ATFM/TF/1)

2.5 ATFM/TF/1 reviewed and amended the initial Terms of Reference which had been drafted by the SCM-BOB and further considered proposals from the FAA and Thailand in respect of automated ATFM system tools, as well as progressing planning for an ATFM operational trial on 29 September 2005

Second Meeting of the ATFM Task Force (ATFM/TF/2)

Thailand BOBCAT System

2.6 Thailand presented ATFM/TF/2 with an updated Concept of Operations for the Bay of Bengal Cooperative ATFM Advisory System (BOBCAT). In respect to the funding of BOBCAT, Thailand advised ATFM/TF/2 that it was their intention to absorb the initial development costs of the automated BOBCAT system. However, if the BOBCAT system was selected by States for implementation, cost-recovery funding arrangements may need to be considered for ongoing operations.

2.7 A demonstration of the BOBCAT system was presented to ATFM/TF/2, using several gateway points along major ATS routes through Bay of Bengal and Kabul FIR. For the purpose of the demonstration, only departures from Bangkok, Kuala Lumpur and Singapore were used.

Airservices Australia and the FAA DOTS+ System

2.8 ATFM/TF/2 was informed that Airservices Australia had recently acquired the FAA Dynamic Ocean Track System Plus (DOTS+) automated system under a technical assistance agreement with the FAA. The DOTS+ platform had been installed at the Melbourne Centre and was being used to generate daily Flex Tracks for the Australian Organized Track Structure (AUSOTS). Under AUSOTS, and within the Australian FIR, aircraft were permitted to operate on daily Flex Tracks between Singapore, Brisbane, Melbourne and Sydney.

2.9 Australia informed ATFM/TF/2 that the FAA was willing to work with Airservices Australia and others to provide a web-based automated ATFM system tool for deployment in the Bay of Bengal, using the Melbourne DOTS+ platform. However there were a number of arrangements that would need to be made, including the drafting of a suitable technical services agreement, approval by the FAA to use the Melbourne installation for applications in the Bay of Bengal as well as other operational and administrative matters for consideration within Airservices Australia. Consequently, it was unlikely that Airservices Australia could arrange an operational trial prior to the beginning of 2006.

The FAA DOTS+ System

2.10 As the FAA was not represented at ATFM/TF/2, attention had been drawn to the two previous DOTS+ presentations that had been delivered by the FAA at RVSM/TF/24 (November 2004) and ATFM/TF/1 (April 2005). In both instances, the FAA had proposed that the web based "Online Track Advisory" function would be utilised in a DOTS+ ATFM system for the Bay of Bengal, however it was emphasised that the "Online Track Advisory" function existed in prototype only at that stage. DOTS + could be readily adapted to provide flow management in the Bay of Bengal area, with an implementation time frame in the order of three months.

2.11 The FAA had highlighted the willingness of the FAA to work with the States of the Bay of Bengal in regard to improving the flow of traffic in the area, and advised that the FAA was ready to answer any questions and enter into further discussions at any time. In respect to funding of DOTS+, during ATFM/TF/1 both Singapore and India had offered, if DOTS+ was selected by the States concerned, that they expected to be able to assist with some of the establishment costs.

ATFM Operational Trial for the Bay of Bengal and South Asia - BOBCAT

2.12 In light of the above ATFM/TF/2, in noting that the proposed implementation date of 29 September 2005 was no longer realistic, considered available options for the conduct of an ATFM operational trial in accordance with Phase One of ATFM across the Bay of Bengal and South Asia. In this regard, ATFM/TF/2 noted Thailand's readiness to proceed to an operational trial and requested Thailand to continue to develop BOBCAT to the stage of an operational trial, in close cooperation with concerned States and IATA.

2.13 Thailand advised ATFM/TF/2 that their target date to be ready for this operational trial would be the end of 2005. Accordingly ATFM/TF/2 agreed to commence an operational trial of the BOBCAT system on AIRAC date 22 December. Arrangements for the operational trial would be confirmed during the ATFM/TF/3 meeting scheduled in September 2005, and the results of the trial would be analyzed by the ATFM/TF during, and on completion of the trial.

<u>Special Coordination Meeting of the ATFM/TF in respect of establishing a Project Management Team (SCM ATFM/TF PMT)</u>

2.14 SCM ATFM/TF PMT agreed that the capabilities of BOBCAT should be demonstrated via a series of desktop or paper trial simulations. The meeting addressed a number of Key Issues in regard to the development of ATFM rules for application during the trial.

2.15 In relation to Thailand's continued development of BOBCAT, the SCM ATFM/TF PMT meeting recognized that it was not feasible for the task force to meet to address each and every question and difficulty that would arise during the development process. The meeting was therefore of the opinion that Thailand should use initiative and judgment in developing BOBCAT and to subsequently demonstrate the capabilities of BOBCAT via paper trials. This would allow Thailand to make decisions and select parameters that would allow it to move forward in development, and would also allow the task force to assess the suitability of the decisions/parameters so selected via the paper trial process, and

initiate changes to the parameters if warranted. Accordingly, the meeting requested Thailand to continue with the development of BOBCAT on this basis, noting that the outcomes of the December 2005 operational trial would also be formally assessed by the task force.

EMARSSH Principles

2.16 The meeting was informed that during SCM ATFM/TF PMT there had been discussion in regard to the applicability and relevance of the "EMARSSH principles" in regard to the development of the ATFM system for the Bay of Bengal. The EMARSSH principles had been developed by APANPIRG/5 (October 1994) and were used in the development of the EMARSSH route network for implementation during November 2002. The principles were as follows:

1. That, using the advantages of existing aircraft capabilities and new CNS/ATM technology and procedures, a revised ATS trunk route structure between Asia and Europe/Middle East will be developed in order to provide safe and efficient air traffic management with the least impact to environmental concerns;

2. That, these ATS trunk routes be developed primarily for international long-haul and medium-haul flights, however they may also be used where necessary for other regional and domestic operations;

3. That, as much as possible planning of ATS trunk routes will be on the basis that each route is laterally separated from each other;

4. That, the development of these route structures will be fully co-ordinated amongst the involved Asia/Pacific ATS Providers and airlines. Also due to the length of these trunk routes, harmonisation is required with both MID and EUR Regions; and,

5. That co-operation is required between all concerned States and the aviation industry, to ensure an efficient flow of international aircraft operations between Asia, Europe and the Middle East.

2.17 The meeting reviewed the EMARSSH principles, recognizing that the intent of parallel route structures was to de-conflict airspace by providing laterally separated routes that operated fully independently from each other. Flights that planned to change from one route to another enroute without compelling reason increased complexity for ATS providers and acted against the intent of the airspace design to de-conflict flight operations. The meeting, noting that the EMARSSH principles had been carried forward into regional ICAO documentation and were widely accepted, considered that no specific action was required by the ATFM/TF in respect of further adoption of the EMARSSH principles.

Progress Report on BOBCAT development

2.18 Thailand presented a progress report to the meeting regarding the on-going development of the BOBCAT automated air traffic management tool.

Conduct of a Paper Trial of BOBCAT

2.19 Thailand advised the meeting that paper trials of BOBCAT would be conducted during the first week of October. States, as well as IATA airlines, would be invited to be present during the trial in order to assess the effectiveness and usefulness of different scenarios during this trial period.

2.20 In this regard, the meeting was advised that the paper trials would simulate various requirements which were expected to give a wide range of results depending on which parameters were included in the BOBCAT system for each test scenario. This would allow the participants present to examine the output and would assist in reaching agreement on the rules to be employed for the operational trial. The trials would include consideration of the following:

a) where required, built-in Mach Number Technique requirements;

b) due to crossing route limitations during this peak period, FL300 will not to be submitted by dispatchers in the slot allocation request out of Singapore, Malaysia and Thailand by aircraft utilizing the northwest parallel route system across the Bay of Bengal during the BOBCAT period;

c) the effect on designating intermediate gateways on certain ATS routes to assist traffic flow across the Indian sub-continent;

d) the use of departure and enroute flight levels as well as the CVSM entry level into Kabul FIR in the dispatcher slot allocation request;

e) the use of wheels-up times submitted by dispatchers in the slot allocation process by BOBCAT plus a 10 minute separation +5 minutes buffer in case of any small delay; and,

f) the requirement to insert Maximum Acceptable Delay (MAD) in slot allocation requests.

2.21 There was considerable discussion and debate on these parameters. It was finally agreed by the meeting that all of these items, both individually and collectively, would be tested during the paper trials in order to facilitate analysis of their effectiveness and necessity in the BOBCAT system.

Discussions between India and Thailand on BOBCAT

2.22 The meeting recalled that at ATFM/TF/2, India raised concerns in regard to a number of operational difficulties which presently occured within their airspace and requested that, where possible, these matters be addressed in the development of BOBCAT. The SCM ATFM/TF PMT meeting agreed that continued coordination and liaison should take place between India and Thailand in an attempt to resolve India's concerns prior to the implementation of the BOBCAT operational trial.

2.23 In this regard, the meeting was advised that India and Thailand had discussed various matters regarding India's concerns and had come to an agreement on the following:

a) *EMARSSH Route Principles*: One of the EMARSSH principles states that, "as much as possible, planning of ATS trunk routes will be on the basis that each route is laterally separated from each other". It was the view of both India and Thailand that this principle implied that aircraft should flight plan to remain on a parallel route and not flight plan to change from one to the other, otherwise the concept of parallel routes was lost. Any change to this procedure should only occur if initiated tactically by ATC. In other words, if a request to change from one route to another does not interfere with other traffic on the second route and, in addition, does not affect another aircraft's ETO at a Kabul gateway, such a request may be tactically processed by ATC.

b) *The use of Intermediate Gateways in the BOBCAT system:* India advised that they were in agreement with the use of intermediate gates along certain ATS routes proceeding to the Kabul FIR. Due to the convergence of one or several routes at certain positions, India were currently experiencing bottlenecks along this route system and requested that spacing should be built into BOBCAT to obviate this matter. If this was not included, the meeting was advised that there would be a strong possibility that some aircraft may not be able to make their Kabul FIR gate time.

"Intermediate Gates" were proposed as follows and the meeting agreed that intermediate gates would be included as one scenario in the BOBCAT paper trials to enable further analysis:

i) P628/G792 - RK
ii) L759/L333/L750 – KKJ, TIGER
iii) M770, P646, L507, A201, B345, to A466/N644 - LLK

c) *Spacing between aircraft transiting Kabul FIR with aircraft using same portion of a route but not transiting Kabul FIR:* Some aircraft transiting Indian airspace on portions of Northern India/ Pakistan routes but not transiting Kabul FIR, still require to be managed with aircraft transiting Kabul FIR. India requested that, where possible, these aircraft be spaced at 10 minutes over LLK with aircraft transiting Kabul FIR.

d) *Flight level priorities for aircraft departing from India and Pakistan Airports*: It was agreed by India that aircraft out of India and Pakistan airports may flight plan to enter Kabul FIR at any level. Notwithstanding this rule, if these aircraft flight plan at FL280, they would be allocated a higher priority for FL280 than aircraft departing airports east of India requesting FL280. Conversely, if aircraft out of India and Pakistan airports flight plan at levels above FL280, they would be allocated a lower priority than aircraft departing airports east of India for levels above FL280.

e) *Spacing of aircraft at Kabul entry gates:* Due to the many variables along the route network established to transit the Kabul FIR, it was agreed between Thailand and India that in strategically allocating BOBCAT entry times into the Kabul FIR, the spacing should be set at 15 minutes. Another consideration to be taken into account was the requirement for transition from double the amount of RVSM levels to CVSM levels prior to this entry point.

2.24 In respect of a) above, IATA advised the meeting that to its knowledge aircraft would not change routes mid flight and if this occurred it would be as a result of the instructions of ATC.

2.25 There was considerable discussion on the above initiatives agreed to by India and Thailand. The meeting agreed that the paper trials would provide opportunity for these parameters to be examined to enable conclusions to be made as to whether they were suitable or necessary for application during the operational trial.

BOBCAT Design Parameters

2.26 Thailand gave a presentation on the BOBCAT design parameters for the benefit of the meeting. The meeting noted that there would be no limitations within an aircraft's slot request on the number of routes or levels requested. BOBCAT assumed that there would be no more than 10 preferences submitted in one slot request.

2.27 The meeting also noted that airline dispatchers would be requested to input a Maximum Acceptable Delay (MAD) for all options within one slot request. BOBCAT assumed that the acceptable delay would be no more than 99 minutes.

2.28 Whereas RVSM flight levels would be selected for en-route positions, CVSM flight levels would need to be selected by dispatchers for gates entering Kabul FIR.

2.29 There would be 5-minute wheels up buffer time allocated in addition to the required spacing between aircraft on departure. Mach Number Technique (MNT) would be taken into account in addition to the 5-minute wheels-up time buffer where required.

BOBCAT Software Development Progress

2.30 Thailand advised the meeting that User Interface design was well under way and would be completed within the first two weeks of September. Core components of BOBCAT software would be ready for paper trials at the end of September/first week of October. The entire BOBCAT software would be ready for integration with the hardware by the end of October/first week of November.

2.31 Hardware would be integrated with the software not later than end of November. The entire BOBCAT System would be thoroughly tested in-house and acceptance trials completed prior to the ATFM operational trial scheduled for 22 December 2005.

BOBCAT System Hardware Procurement

2.32 The meeting noted that the requirements for BOBCAT system architecture had been finalized on 30 August 2005. The hardware procurement process had commenced with hardware delivery expected by the second half of October/first half of November 2005. Once the hardware had been delivered, integration testing between BOBCAT hardware and software would progress as planned. A system architecture diagram is shown in Figure 1.

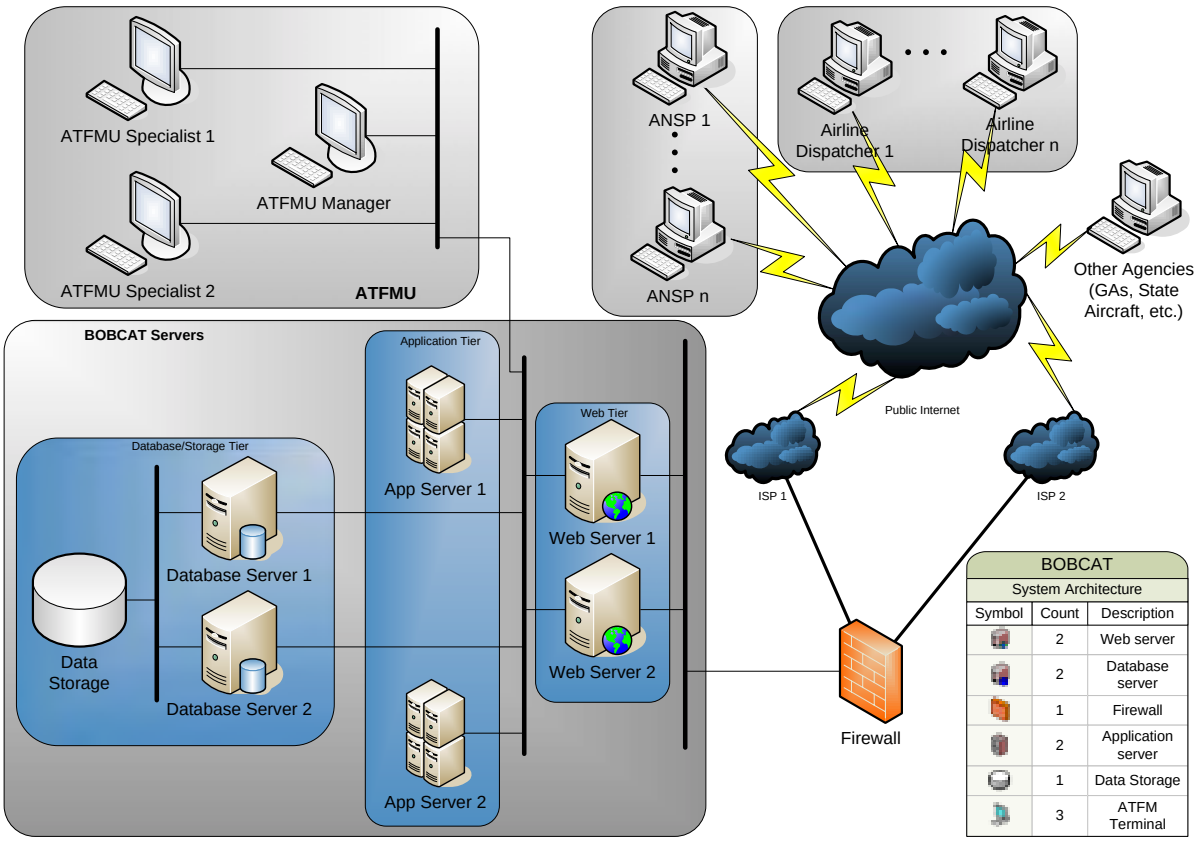

Figure 1: BOBCAT System Architecture

Security Considerations for BOBCAT

2.33 Thailand advised the meeting that an important requirement of the BOBCAT system was the need for a robust security system for the various modules which would be accessed by a variety of users. In order to ensure that aircraft operational information submitted to BOBCAT was authentic, the meeting was advised that the system would be designed so that dispatchers would only be able to submit requests for aircraft they were responsible for. Prior to the operational trial, airline companies would be required to complete a designated form listing other airlines which they have made arrangement to perform dispatching duties on their behalf and send to the manager of the ATFMU for registration.

2.34 Each dispatcher or each ACC would have their own set of usernames and passwords to operate the BOBCAT system. This provision would also ensure security of the system. In circumstances where there was a change of authorized personnel within an organization, the current username/password would be removed and a new username/password would then be added if required. Any change to username/password would be formally notified to the Manager of the ATFMU.

Establishment of the Air Traffic Flow Management Unit (ATFMU)

2.35 Thailand advised the meeting that they had commenced planning and development of the ATFMU. This facility would be located either in or alongside the Bangkok ACC.

ATFMU staffing and hours of operation

2.36 The meeting agreed that the operating hours of the ATFMU would be between 0800UTC to 2400UTC. This would fulfill flight planning requirements for all aircraft requesting slot times to enter Kabul FIR from 1900UTC and be clear of Kabul FIR by 2400UTC.

2.37 The staffing of the ATFMU would consist of 3 trained and qualified officers. The roles and responsibilities for these positions would be fully detailed in the ATFM Handbook. The nominated positions were as follows:

a) ATFMU manager who would have overall responsibility for ATFMU operations;

b) ATFMU I position responsible for BOBCAT operations; and

c) ATFMU II position responsible for coordination with airline dispatchers, other parties inputting to BOBCAT (GA operators etc) and ANSPs involved.

2.38 In addition, a technician who was qualified and trained on all BOBCAT facilities would be on duty during the ATFMU operating hours.

ATFMU Facilities

2.39 It was proposed that the unit would contain the following facilities:

a) 1 ATFM terminal for each ATFMU position;
b) 1 additional desktop computer (internet access) for office use
c) 2 telephone lines with IDD capability
d) 1 Printer
e) 2 fax machines with IDD capability
f) 1 AFTN/ATN terminal (VTBBZDZX)

Training Program

2.40 A detailed training programme would be developed for all ATFMU officers. Details of the training programme are as follows:

Theory of BOBCAT – role and responsibilities	31-Oct-05	2-Nov-05
BOBCAT practical simulation exercises using ATFMU systems	7-Nov-05	11-Nov-05
Continuous training during BOBCAT system testing	14-Nov-05	9-Dec-05
Evaluation and rating in BOBCAT procedures and management	13-Dec-05	16-Dec-05
Final operational review/briefing prior to Operational Trial	19-Dec-05	21-Dec-05

2.41 The meeting was advised that once BOBCAT operational trials commenced, fine tuning of BOBCAT may be required. This would be readily undertaken without any disruption to the flight operations of airlines concerned.

Selection of BOBCAT slot times by airline dispatchers

2.42 The meeting recalled that discussion throughout previous ATFM meetings had placed considerable importance on the degree of fairness and randomness in the BOBCAT slot allocation process. In this regard, through the development of BOBCAT, Thailand had encountered an important trade-off between such a degree of fairness or randomness of slot selection compared to optimal slot allocation with respect to maximizing airspace usage.

2.43 The meeting was advised that, throughout the extensive development process of BOBCAT, Thailand concluded that the Maximum Acceptable Delay (MAD) factor was an important parameter in building a slot allocation request by dispatchers. A full understanding and judicious use of MAD would allow for considerable flexibility in slot allocation requests.

2.44 Thailand reported the results of a study undertaken in relation to the importance of Maximum Acceptable Delay (MAD) factor as a parameter within an aircraft's BOBCAT slot request. It was demonstrated by several simple examples that, when used properly, appropriate MAD selection could greatly assist the airline in nominating either their preference for route flexibility or their willingness to take delays in order to obtain slot allocation on a particular route. The meeting noted that proper and judicious MAD nomination could allow airline dispatchers greater flexibility.

2.45 Throughout the design process of BOBCAT, it had become evident that there existed a trade-off between random slot allocation process and overall effective airspace utilization using the Kabul FIR entry time as the driving parameter. A detailed explanation of various scenarios was presented to the meeting using both the random selection process as well as the optimal use of airspace usage concept (**Appendix C** refers).

2.46 Thailand demonstrated to the meeting that that allocating slots in order of estimated time of entry into Kabul FIR would result in the best-case optimization with respect to:

a) delay assigned to aircraft;
b) total delay suffered by all aircraft;
c) fairness of distribution of delay suffered by aircraft; and
d) timing of availability of ATS route over Kabul FIR.

2.47 In contrast, a completely random slot allocation process could result in extreme delay imposed on aircraft in addition to wasting slots available on ATS routes over Kabul FIR, as well as unfair distribution of delay assigned to aircraft. Thailand also advised the meeting that example shown to the meeting was one in which aircraft were transiting at the same speed. The worst case scenario would be exacerbated in the presence of slower aircraft in the middle of the set of aircraft requesting slots, particularly if the request for slot allocation for the slower aircraft was made before requests from the faster aircraft. In addition, the optimization of the Kabul FIR entry time was dependent on the accuracy of aircraft Kabul FIR entry time estimates.

2.48 The meeting noted the importance of the trade-off necessary between a completely random slot allocation process and optimal slot time for Kabul FIR entry time. In the spirit of the Task Force's mandate to optimize traffic within the region in addition to the goal of Phase One implementation of ATFM automated tool in alleviating traffic congestion and optimizing traffic flow through Kabul FIR, the meeting agreed that the slot allocation process should optimize Kabul FIR entry times. Random slot allocation would be applied as a parameter in circumstances where aircraft had a very similar Kabul FIR entry time at the same gateway.

2.49 The meeting recognized that these design parameters were of a developmental nature and would be tested during the BOBCAT paper trials. Subsequent to analysis of the trial outcomes, parameters for the operational trial would be decided. The meeting noted that experience gained during the operational trial would also be considered in establishing appropriate operational parameters.

Update BOBCAT Concept of Operations

2.50 The meeting noted that, unlike most other enroute air traffic flow management systems, in the BOBCAT area of responsibility some aircraft operate from departure points to the entry gates into the Kabul FIR through more than 10 FIRs which have various longitudinal spacing requirements depending on CNS capabilities. Each ATS provider concerned had a role to play to ensure that the ATFM system would be successful.

2.51 Thailand provided an updated Concept of Operations for BOBCAT (**Appendix D** refers) for review by the meeting. As a part of the ongoing development of BOBCAT, the Concept of Operations document had been updated to reflect changes and improvements made to the design of the BOBCAT system. The meeting noted that as a result of the ongoing work with respect to the BOBCAT Human Machine Interface (HMI), Section 5 of the Concept of Operation document was still under review.

Agenda Item 3: Flow Management Handbook

3.1 In accordance with the provisions of ICAO Doc 4444 (PANS-ATM) Ch 3.2.1.5, ATFM/TF/1 had agreed that an ATFM Handbook should be developed as a Task List item (ID 2.2. refers). Further, the ATFM Handbook should include the operating procedures and associated guidance material for the ATFM Unit, ACCs and Airline operators.

3.2 Accordingly, a first draft of the Bay of Bengal and South Asia ATFM Handbook (V1.0) was presented to ATFM/TF/2 for consideration and amendment by the meeting. The ATFM Handbook adopted a two part format, with Part I assigned to the “Traffic Management Plan” and Part II assigned to the “ATFM System Tool & Operations”.

3.3 The meeting reviewed material presented by Australia comprising components of the Business Rules associated with the implementation of the Central Traffic Management System (CTMS/Skyflow) at Sydney Airport. This documentation had been published to address the circumstances of **Who** does **What** and **When** to operate the system. The meeting considered that some aspects of this documentation was applicable in the context of the ATFM Handbook and agreed to incorporate relevant components into the Handbook.

3.4 The meeting recognized that the ATFM Handbook would also need to incorporate a significant amount of information that would not be available until after the paper trials of the BOBCAT system had been conducted. As the paper trials would not be completed until early October, the meeting agreed that the Handbook would be best progressed by a small work group working via correspondence in order to prepare a final draft of the ATFM Handbook, to be reviewed and adopted during the ATFM/TF/4 meeting scheduled in November 2005. This would facilitate the use and updating of the final draft ATFM handbook during the BOBCAT Workshop that would be held during ATFM/TF/4 and would allow sufficient time for the updated Handbook to be widely circulated prior to the commencement of the operational trial.

3.5 The ATFM Handbook working group would be led by the Task Force Chairman and include representation from India, Thailand (AEROTHAI) and IATA to assist with the preparation of the document.

Agenda Item 4: Operational Trial Arrangements

Paper Trial

4.1 Thailand had informed the meeting that they would be conducting the initial paper trials of BOBCAT during the first week of October and would be documenting the results for analysis by the task force. The meeting recognized that in order to ensure that the AIP Supplement was prepared and distributed in time to meet the 27 October 2005 AIRAC date for the operational trial on 22 December 2005, all information for the AIP supplement would need to be available by 13 October 2005. This would necessarily include information that became available as a result of the paper trials and which would need to be immediately incorporated into the draft AIP Supplement.

4.2 As the next opportunity for the task force to meet was not until the second week of November 2005, the meeting agreed that suitable State delegates should attend the BOBCAT paper trials as scheduled and provide feedback during the trials to assist with final enhancements to BOBCAT. This would also provide an opportunity to incorporate final amendments to the draft AIP Supplement which had a cut off date of 10 October 2005. The trials would be conducted at the premises of AEROTHAI in Bangkok, Thailand and delegates from India, Malaysia, Pakistan, Singapore and IATA were urged to attend. The Regional Office would issue invitations requesting attendance at the final 3 days of the trials (5-7 October 2005) and AEROTHAI would make the arrangements and circulate final details as they became available.

Data Requirements

4.3 The meeting noted the importance of having suitable data available for both the paper trial and to establish the base position in respect of current delays in order to allow the effect of the operational trial to be measured.

4.4 Traffic disposition on the Bay of Bengal routes could vary significantly on a seasonal basis as a result of prevailing winds. During the period June to November, traffic was able to utilize the southern routes, however during the period November to April departures from Singapore tended to choose routes further north to mitigate the effects of prevailing head winds. This led to crowding on the northern routes as the Singapore departures joined traffic from Kuala Lumpur and Bangkok.

4.5 In respect of the paper trial, the meeting therefore agreed that two data samples were required. Significant data for the period 3 – 9 April 2005 had already been captured by the task force and was available for the BOBCAT trial. However, data from Kuala Lumpur had not been provided during the April sampling period and Malaysia undertook to try and obtain the data for this period and forward to the task force.

4.6 The meeting agreed that a second data sample for the period 18-24 September 2005 was required. The meeting agreed that data was to be recorded by India, Malaysia, Singapore and Thailand using appropriate templates (**Appendix E** refers) and the methodology that had been adopted for the data sampling completed in April. The April and September data would comprise the basis of the data for the paper trial.

4.7 In order to allow AEROTHAI to prepare and undertake a suitable paper trial of BOBCAT, the meeting agreed that AEROTHAI would prepare a synthetic data set for trials that utilized, as the core, the data from April and September 2005. However, in order to test specific parameters and simulate heavy traffic conditions, additional synthetic data would be included in the data set. This would comprise extra fictitious aircraft that would be added to the genuine traffic to increase traffic loadings on particular routes etc.

4.8 In addition, as the genuine traffic samples would only include the single flight planning option that was actually used, the meeting agreed that up to three additional route and/or flight level preferences would be artificially added per flight in the data set in order to simulate a dispatcher making a number of choices as part of the slot allocation request.

4.9 The meeting agreed that the delegates listed in the participants list for the meeting would act as the contact points for the gathering and relay of data between States and AEROTHAI. Additional details have been included in the participant list for Mr. Lim (Malaysia) and Mr. Somasundaram (India). Although these officers did not attend the ATFM/TF/3 meeting, these officers were task force core team members and should be used as the contact point for data relay for Malaysia and India respectively.

Equipment Requirements

4.10 In order to participate in the trial, the preferred method for airlines and ATS providers to access BOBCAT would be by way of the public internet. This made it necessary for participants to have reliable access to suitable computer equipment that satisfied the following minimum specifications:

A Personal Computer of any operating system with the following characteristics

- Processor: minimum CPU clock speed of 150 MHz
- Operating System: Any that operates one of the following web browsers (i.e. Windows 2000/XP, Linux, Unix, or Mac OS)
- RAM: 128 MB or larger (depending on operation system)
- Harddisk Space: minimum of 500 MB or larger (depending on operating system)
- Monitor Display Resolution: Minimum of 1024 x 768 pixels
- Web Browser: Internet Explorer 5.5 or newer, Mozilla 1.0 or newer, Mozilla Firefox 1.0 or newer, Netscape 7 or newer
- Internet Connection : 56 Kbps Modem or faster Internet connection

4.11 The meeting agreed that details of these requirements should be included in the AIP Supplement that would be issued 56 days prior to the commencement of the trial. However, the meeting recognized that some organizations and administrations had lengthy procurement processes and, if equipment of this nature had to be acquired, considered that the notification period provided by the AIP Supplement may not be sufficient to allow equipment procurement. Accordingly, the meeting requested that the Regional Office issue a State Letter advising the commencement date of the operational trial and notifying the minimum equipment specifications described above.

Training Requirements

4.12 The meeting agreed that training would be required for dispatchers from as many airlines as possible, and that ATS users of BOBCAT would also benefit from attending a training workshop. Consequently the meeting agreed to arrange a two day BOBCAT Workshop, to be held on the Wednesday and Thursday of the ATFM/TF/ 4 meeting during 7-11 November 2005. The Regional Office would issue invitations to States and to IATA, and IATA would complete coordination with airlines.

4.13 The meeting recognized the important role the Bay of Bengal and South Asia ATFM Handbook in providing training material for users of the system and agreed that the Handbook should contain as much information as possible in respect of interactions with the system. The ATFM Handbook should also be posted on a suitable website and the web address be widely circulated.

4.14 IATA offered to coordinate a one night simulation with as many airlines as possible submitting simulated requests, including second and third preferences for routes and flight levels, to

AEROTHAI. This would allow AEROTHAI the opportunity to identify and correct difficulties and would also provide hands on experience to participating airlines. The meeting agreed that the date selected for this simulation should be after the AIP Supplement had been published in late October and after the BOBCAT workshop had been conducted on the second week of November. The Supplement and the Workshop were expected to raise awareness of the trial amongst airlines and the one night simulation would provide a further opportunity for dispatchers to become familiar with the system. The meeting agreed that a night in the second half of November or early December 2005 would be most suitable.

Role of ATS Providers

4.15 The meeting acknowledged the important role that ATS Units would play in the conduct of the trial. Airline operators would be provided with a slot time that they were then obliged to meet. Accordingly, appropriate handling would be required from ATS providers to ensure that airlines were able to meet the slot times as issued. Delays in becoming airborne on departure would result in aircraft missing published wheels up times and enroute delays could result in aircraft missing gateway times. ATS providers would need to ensure that all ATC staff were cognizant of the need to review the published list of slot allocations regularly and assist aircraft to meet their respective slot times. In this respect, the meeting noted the provisions of PANS ATM Part 7-8, paragraph 7.8.1, which enable adjustments to be made to the sequence of departing aircraft in respect of aircraft subject to ATFM requirements.

Implementation and Duration of Trial

4.16 In considering the implementation of the trial, the meeting recognized that a staged implementation of the trial would be beneficial. During the early stages of operation, all parties would need to become familiar with BOBCAT and the procedures in the ATFM Handbook. The meeting considered that a 7 day period of hands on operation, in which all functions were carried out but the slot times were not actually applied to traffic, would allow all participants to become fully familiar with what was required. This period could also be used to advantage by dispatchers to create repetitive or stored flight plan databases. Subsequent to the week of ‘dry run’, live operations could commence with BOBCAT derived slot times being applied to operational traffic. The meeting agreed that Stage 1 would commence on AIRAC date 22 December 2005, with Stage 2 live operations commencing a week later on 29 December 2005. Final details would be clarified in the trigger NOTAM.

4.17 The meeting agreed that subsequent to the implementation of live operations, it would be necessary to allow a reasonable period for the trial to become established. Although it was considered an unlikely scenario, the meeting considered that if there were dramatic difficulties in the live operations the trial would need to be suspended immediately whilst investigation and remediation was undertaken. Otherwise the trial would be subject to a formal review process during the ATFM/TF/5 meeting which would be held on 16 & 17 January 2006, immediately prior to the BBACG/17 meeting on 18 – 20 January 2006. It was anticipated that the review by ATFM/TF/5 would provide the task force with sufficient information to enable decisions to be taken in respect of the trial.

Agenda Item 5: Safety Assessment

5.1 The meeting recalled that the standards and recommended practices relating to the implementation by States of safety management programmes for Air Traffic Services (ATS) were introduced in Section 2.26 of Amendment 40 to Annex 11 – *Air Traffic Services*, which became applicable on 1 November 2001. Further provisions relating to the implementation of these safety management programmes, applicable from the same date, are contained in Chapter 2 of *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444).

5.2 The meeting recognized that the implementation of these provisions had implications for both providers of air traffic services, and the regulatory bodies within the States. However, it was the State which was responsible for implementation of ICAO SARPS within the airspace and at aerodromes for which it had responsibility and, in this context, for maintaining an acceptable level of safety in their operations.

Safety Assessment

5.3 Annex 11, paragraph 2.26.5, requires States to undertake a safety assessment prior to the implementation of any new separation minimum or procedure, in order to demonstrate that it meets an acceptable level of safety. Annex 11 requires that any significant safety-related change to the ATC system shall only be implemented after a safety assessment has demonstrated that an acceptable level of safety will be maintained. More specific information on the circumstances in which a safety assessment could be required can be found in the PANS-ATM, Chapter 2, Section 2.6.

5.4 Safety assessment is a structured and systematic process for the identification of hazards and assessment of the risk associated with each hazard. A safety assessment based on these concepts is essentially a process for finding answers to three fundamental questions:

- What could go wrong?
- What would be the consequences? and
- How often is it likely to occur?

5.5 If the result of an assessment is that the system under review does not satisfy the safety assessment criteria, it will be necessary to find some means of modifying the system in order to reduce the risk. This process is called risk mitigation. The development of mitigation measures becomes an integral part of the assessment process, since the adequacy of the proposed mitigation measures must be tested by re-evaluating what the risk would be with the mitigation measures in place.

5.6 The purpose of safety assessment documentation is to provide a permanent record of the final result of the safety assessment, and the arguments and evidence demonstrating that the risks associated with the implementation of the proposed system or change have been eliminated, or have been adequately controlled and reduced to a tolerable level.

BOBCAT Safety Assessment

5.7 The meeting considered the safety aspects in relation to the introduction of BOBCAT during the operational trial. The meeting acknowledged that BOBCAT was not intended nor designed to "control" aircraft or take away any of the responsibilities of the ATS providers concerned. In accordance with Phase One of the ATFM system, the purpose of BOBCAT was to regulate the flow of air traffic departing airports from East Asia, Southeast Asia and South Asia which planned to transit the Kabul FIR between the hours of 1900UTC and 2400UTC.

5.8 The meeting recognised that BOBCAT was an advisory system which did not have executive control of aircraft. Nevertheless, BOBCAT would provide scheduling information for aircraft departures and, if the system did not perform to design expectations, may lead to traffic congestion. In this context, the meeting reviewed information provided by Australia comprising components of the Safety Case associated with the implementation of the Central Traffic Management System (CTMS/Skyflow) at Sydney Airport and conducted a hazard identification activity.

5.9 As a result of hazard identification activities, the meeting defined hazards as described below and commenced preliminary work on accurately collating mitigation activities. Full details of each identified hazard have been recorded in the Hazard Log included as **Appendix F.** The meeting agreed that a safety statement would be finalised during ATFM/TF /4 to record the safety issues identified by the task force, but noted that no safety impediment to the conduct of the operational trial was anticipated.

a) **Hazard 1 - Data**
Non-standard, incorrect or corrupt data leading to erroneous advisory information.

b) **Hazard No 2 - Software**
Errors or bugs in software updates leading to erroneous advisory information.

c) **Hazard No 3 - Hardware**
Hardware or networking failures or incompatibilities leading to absence of advisory information or promulgation of erroneous advisory information.

d) **Hazard No 4 – Operator Error**
Inadequate or inappropriate information entered into the system by the operators leading to erroneous advisory information.

e) **Hazard No 5 – Airspace Operational Status**
Unforeseen changes in airspace operational status leads to sudden reduction in airspace capacity.

f) **Hazard No 6 – Industry Non-Compliance**
Industry does not comply with agreed wheels up and/or gateway fix times leading to congestion and un-flowed traffic sequence.

g) **Hazard No 7 – ATS Unit Non-Compliance**
ATS Units do not comply with agreed wheels up and/or gateway fix times leading to congestion and un-flowed traffic sequence.

Agenda Item 6: Draft AIP Supplement

Issuance of AIC

6.1 The meeting was advised that SCM ATFM/TF PMT had reviewed and updated the draft Aeronautical Information Circular that had been prepared by the Task Force, and included amendments that were agreed during the meeting.

6.2 SCM ATFM/TF PMT had agreed that the AIC should be issued as soon as possible in order to provide the maximum notice of the commencement of the ATFM operational trial on 22 December 2005. SCM ATFM/TF PMT requested that the Regional Office contact India, Malaysia, Pakistan, Singapore and Thailand and request the issue of an AIC using the sample text that had been agreed by the meeting**.**

6.3 After concluding necessary coordination with Pakistan, who had been unable to attend SCM ATFM/TF PMT, the Regional Office transmitted letters dated 30 August 2005 (ref: AP-ATM0342) to India, Malaysia, Pakistan, Singapore and Thailand on behalf of ATFM/TF. The letter from the Regional Office requested that State AICs containing text similar to the sample text as agreed by SCM ATFM/TF PMT (**Appendix G** refers) be issued as soon as possible.

Draft AIP Supplement

6.4 India presented the meeting with an initial framework to assist in the development of an AIP Supplement for the operational trial. The meeting appreciated the work that had been done by India in this regard and continued with the development of the AIP Supplement. A copy of the current draft AIP Supplement has been included as **Appendix H.**

6.5 The meeting recognized that in order to ensure that the AIP Supplement was prepared and distributed in time to meet the 27 October 2005 AIRAC date for the operational trial on 22 December 2005, all information for the AIP supplement would need to be available by early October. A significant amount of technical information would be confirmed during the paper trials during 3-7 October and would then be incorporated into the AIP Supplement.

6.6 In order to ensure the timely progression of the draft AIP Supplement, the meeting formed a small work group including Thailand, Malaysia, Singapore and India which would work via correspondence. The meeting gratefully accepted the offer from Singapore to use the services of the AIS section of CAAS to finalize the formatting of the AIP Supplement once the drafting was complete.

Agenda Item 7: Develop a Coordinated Plan for implementation of actions agreed by the Task Force

7.1 The meeting agreed to the following steps in order to ensure the commencement of the operational trial on 22 December 2005 as scheduled:

Date	Activity	Responsible	Remarks
18 – 24 September	Collection of traffic data	India, Malaysia, Singapore and Thailand	Data to be submitted to AEROTHAI via email by 30 September 2005.
3 – 7 October	BOBCAT Paper Trials	Thailand	At AEROTHAI premises, Bangkok. Representatives from India, Malaysia, Pakistan, Singapore and IATA to attend
Final Draft by 10 October	Finalize AIP Supplement details and distribute to States	AIP SUPP work group (Singapore, Thailand, India, Malaysia, IATA)	Singapore to provide AIS support to format draft AIP SUP

Date	Activity	Responsible	Remarks
13 October	Publish AIP Supplement	India, Malaysia, Pakistan, Singapore and Thailand	AIRAC date 27 October gives 2 cycle notification
Final Draft by 7 November	ATFM Handbook	ATFM Handbook workgroup (Chairman, India, Thailand, IATA)	Final Draft Handbook to be used during Dispatcher Workshop
7 – 11 November	ATFM/TF/4 including BOBCAT Workshop (2 days)	Task Force	Consider Final Draft of ATFM Handbook, Finalize Safety Statement, BOBCAT Workshop , Review Paper Trial, Draft NOTAM (as reqd) to update AIP SUP
15 December	Issue Trigger NOTAM	India, Malaysia, Pakistan, Singapore and Thailand	
22 December	Commence Operational Trial	All	Stage 1 – 1 week shadow/ghost; Stage 2 – full operations
16 & 17 January 2006	ATFM/TF/5 - Two day Trial Review Meeting	Task Force	To be held in conjunction with BBACG/16 from 18-20 January 2006

Agenda Item 8: Review and Update ATFM/TF Task List

8.1 The meeting reviewed and updated the ATFM/TF Task List in light of the inputs and discussions that occurred during ATFM/TF/3. The revised Task List is shown as **Appendix I.**

Agenda Item 9: Any Other Business

Review of APANPIRG/16

9.1 The Sixteenth Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/16), which was held at Bangkok, Thailand from 22 – 26 August 2005 had been updated in respect of the activities of the ATFM/TF.

9.2 The meeting reviewed the report of APANPIRG/16 as relevant to the work of the ATFM/TF, noting that APANPIRG/16 had been informed that the ATFM/TF had authorized the issue of an AIC notifying the commencement of an operational ATFM trial on 22 December 2005, which would utilize the Bay of Bengal Cooperative Air Traffic Flow Management Advisory System (BOBCAT) under development by Thailand.

FAA DOTS+ Update

9.3 The meeting considered information provided by the United States FAA in respect of developments relating to the Dynamic Ocean Track System Plus (DOTS+). Three major DOTS+ software builds had been completed in the last eight months. A fourth update was nearly complete and was expected to be in operational use by October 2005. These updates included numerous enhancements to the DOTS+ human machine interface, weather data processing, Aeronautical Fixed Telecommunication Network messaging, system security, track generation, and a major increase in the number of adaptable sectors, fixes and airways allowed in the system.

9.4 The FAA supported the ongoing efforts by the Bay of Bengal ATFM Task Force to identify the most expeditious and effective tools to create greater efficiency over the Bay of Bengal and through the Kabul FIR. The DOTS+ system was adaptable for this purpose, and could be readily modified through a proven and established software enhancement process to meet the unique needs of the region.

9.5 The meeting appreciated the interest expressed by the FAA in the collaborative process that the ATFM Task Force had initiated for the Bay of Bengal. The meeting thanked the FAA for their continued interest in being considered as a partner in efforts to improve regional and, by extension, global air traffic efficiency.

9.6 India informed the meeting that it would be prepared to fund the entire set up costs and host DOTS+ in the event that it was selected by the States of the Bay of Bengal as the operational ATFM system tool.

Review of BANP and Asia Pacific Regional Plan for the New CNS/ATM Systems

9.7 The meeting reviewed the Asia Pacific Regional Plan for the New CNS/ATM Systems in respect of ATFM and traffic flow arrangements, noting that major traffic flow AR4 had been identified and included in the plan. Major traffic flow AR-4 comprised a bi-directional traffic flow between Asia and Europe in the area south of the Himalayas, with a split occurring over the Indian subcontinent (**Appendix J** refers). One flow was from India towards Hong Kong, China and Japan whilst the other flow was to South- East Asia. The split flow joined over India and created considerable complexity for Indian air traffic controllers. India re-affirmed that they were hopeful that the Phase 2 implementation of ATFM in the Bay of Bengal would assist in managing this traffic complexity in due course.

9.8 The meeting also reviewed the Asia/Pacific BANP, noting relevant sections in relation to ATFM issues. These have been included as **Appendix K.**

Agenda Item 10: Date and Venue for the next meeting

10.1 The meeting agreed that the ATFM/TF/4 would be held on 7 -11 November 2005, at the Regional Office premises in Bangkok. The meeting would be held over 5 days, of which the Wednesday and Thursday would comprise the BOBCAT Workshop. A review of the operational trial would be undertaken during the combined meeting of the ATFM/TF/5 and BBACG/17 during 16 -20 January 2006.

Closing of the meeting

10.2 The Chairman, in closing the meeting, thanked the participants and their Administrations for their excellent support and contributions, as well as to the Asia/Pacific Regional Office for the arrangements and support provided which greatly contributed to the success of the meeting.

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LIST OF WORKING PAPERS (WPs) AND INFORMATION PAPERS (IPs)

WORKING PAPERS

NUMBER	AGENDA	WORKING PAPERS	PRESENTED BY
WP/1	1	Provisional Agenda	Secretariat
WP/2	2	Development of Business Rules	Australia
WP/3	2	EMARSSH PRINCIPLES	Secretariat
WP/4	5	ATFM Safety Case Example	Australia
WP/5	3	ATFM Handbook	Secretariat
WP/6	8	ATFM/TF Task List	Secretariat
WP/7	2	History of the ATFM Task Force	Secretariat
WP/8	2	Selection of BOBCAT Slot Time by Dispatchers	Thailand
WP/9	2	Progress Report on BOBCAT Development	Thailand
WP/10	5	ICAO Safety Management System Provisions	Secretariat

INFORMATION PAPERS

NUMBER	AGENDA	INFORMATION PAPERS	PRESENTED BY
IP/1	-	List of Working Papers (WPs) and Information Papers (IPs)	Secretariat
IP/2	4	Aeronautical Information Circular (AIC) for ATFM Operational Trial	Secretariat
IP/3	9	Review of APANPIRG/16	Secretariat
IP/4	9	Update on the FAA Dynamic Ocean Track System Plus (DOTS+)	Australia on behalf of the United States
IP/5	2	Update of BOBCAT Concept of Operation	Thailand

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Bay of Bengal Cooperative Air Traffic Flow Management Advisory System (BOBCAT)

ATFM/TF/3-APDX C to the Report

Selection of BOBCAT Slot Time by Dispatchers

6-9 September 2005

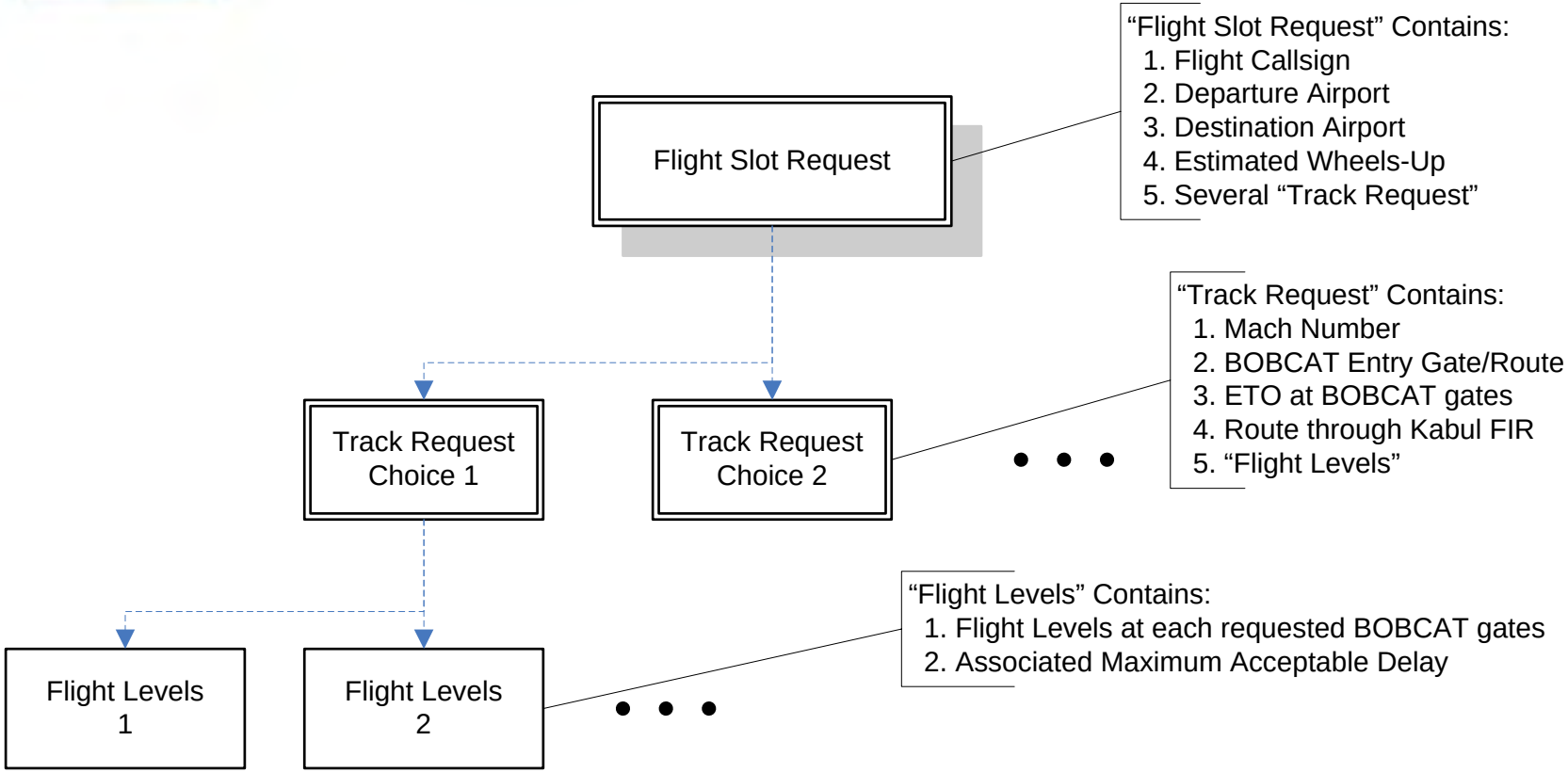
Presented by ***AEROTHAI***

Bay of Bengal Cooperative Air Traffic Flow Management Advisory System (BOBCAT)

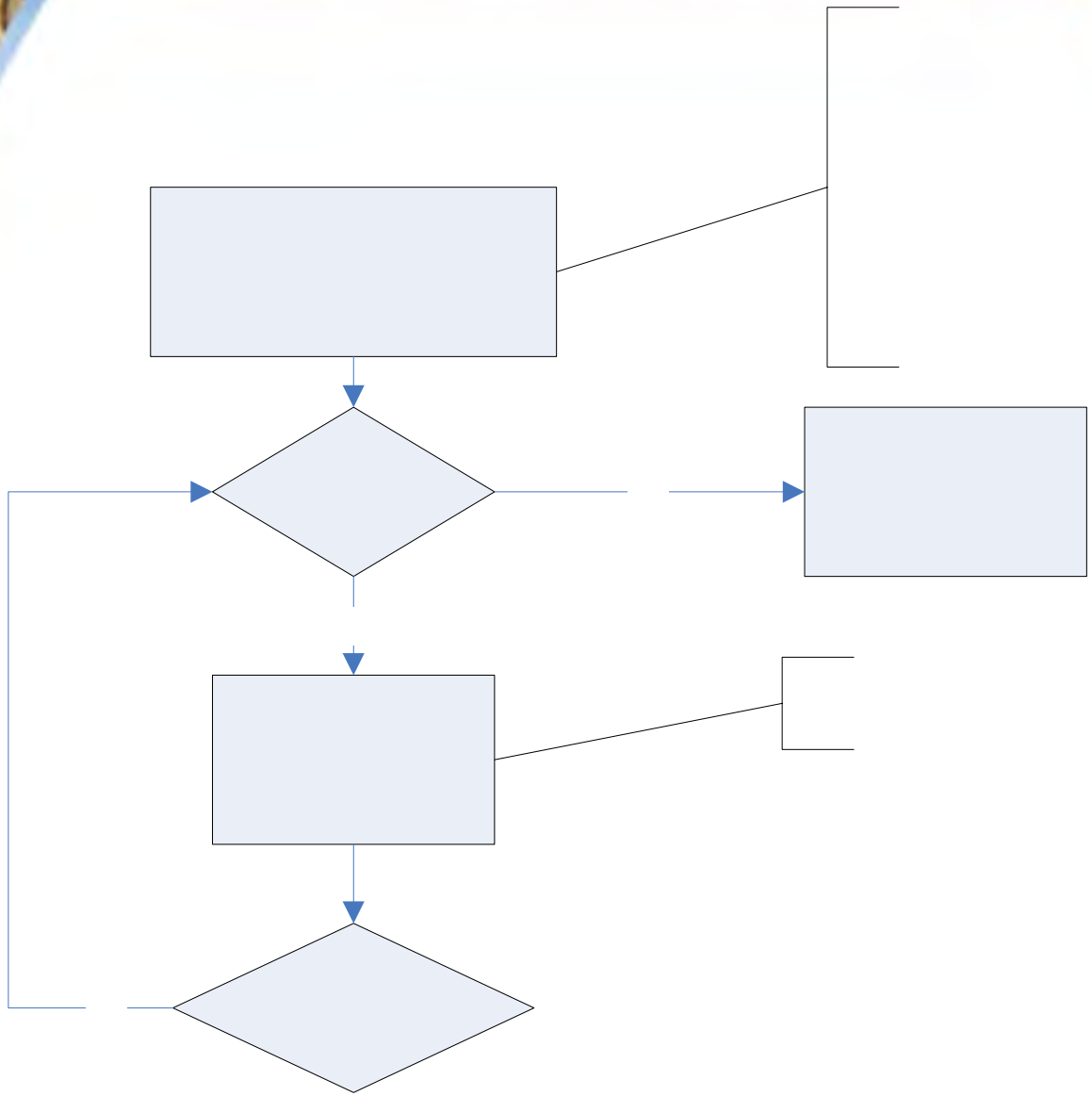
BOBCAT Basics

Presented by ***AEROTHAI***

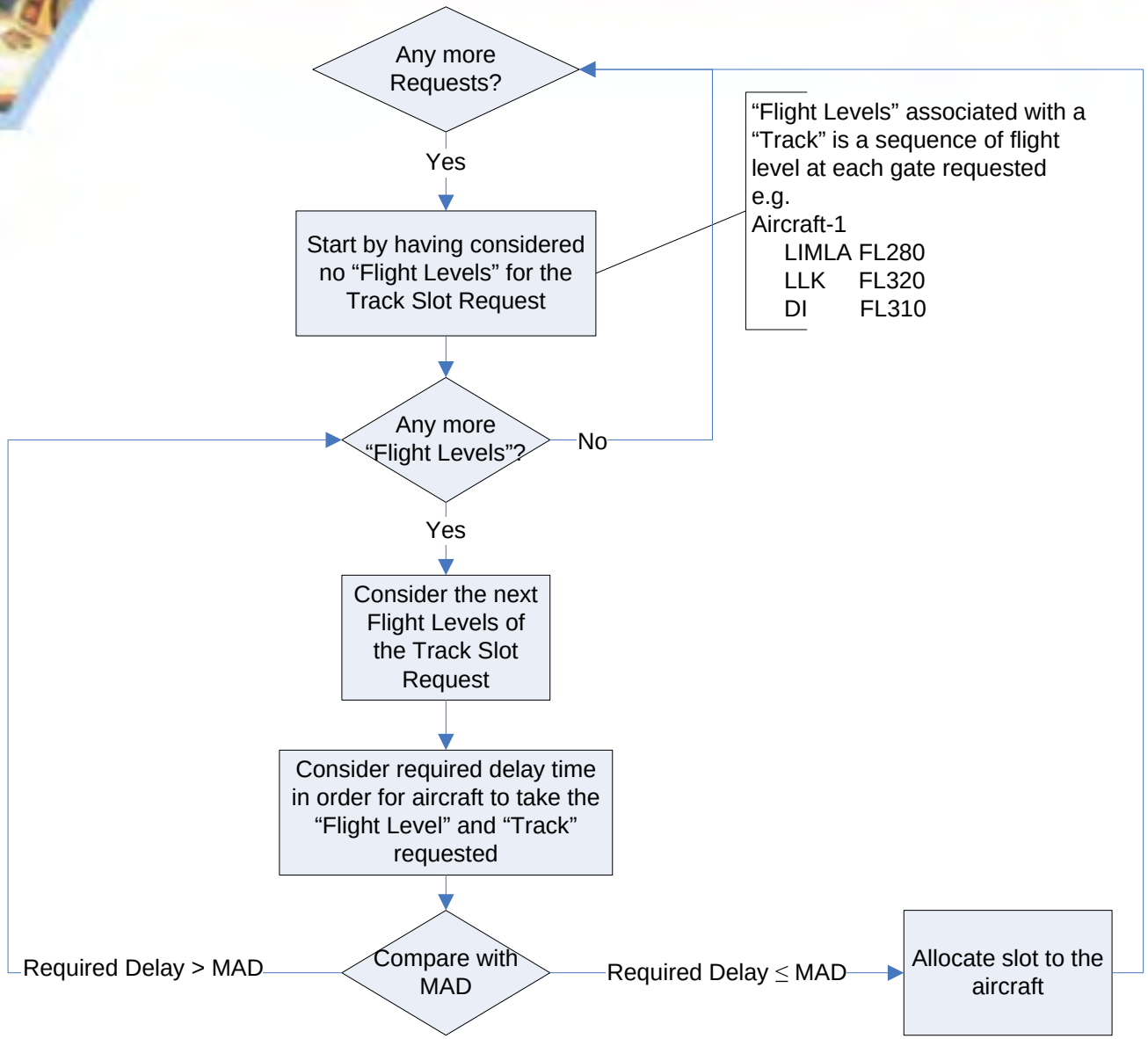
BOBCAT Request



BOBCAT Slot Allocation (1)



BOBCAT Slot Allocation (2)



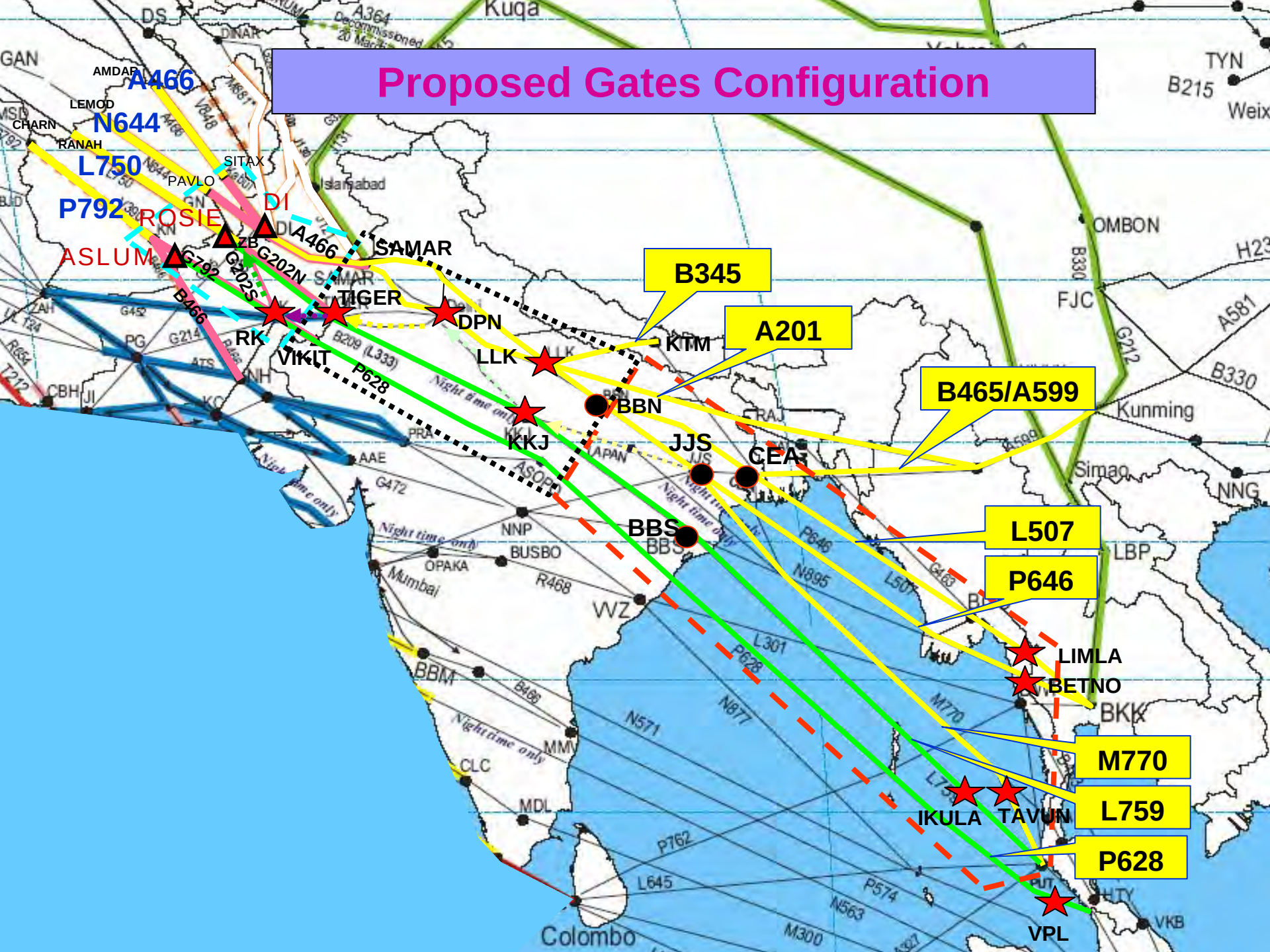
Bay of Bengal Cooperative Air Traffic Flow Management Advisory System (BOBCAT)

Maximum Acceptable Delay

Part 1

Presented by ***AEROTHAI***

Proposed Gates Configuration



Flight Slot Request – AC1

AC1 Choice	Departure	Wheels-Up	Route		FL		MAD
			BoB	Kabul	BoB	Kabul	
1	WSSS	1000UTC	L759	L750	280	310	60
						350	60
2	WSSS	1000UTC	M770	N644	280	310	60
						350	60
3	WSSS	1000UTC	P628	G792 V390	280	310	90
						350	90

Flight Slot Request – AC2

AC2 Choice	Departure	Wheels-Up	Route		FL		MAD
			BoB	Kabul	BoB	Kabul	
1	WSSS	1000UTC	L759	L750	280	310	10
						350	10
2	WSSS	1000UTC	M770	N644	280	310	60
						350	60
3	WSSS	1000UTC	P628	G792 V390	280	310	90
						350	90

Allocation Scenario 1

Aircraft	DEP	Wheels-Up	Route		FL		Assigned Delay
			BoB	Kabul	BoB	Kabul	
AC2	WSSS	1000UTC	L759	L750	280	310	0 *(10)*
AC1	WSSS	1015UTC	L759	L750	280	310	15 *(60)*

Allocation Scenario 2

Aircraft	DEP	Wheels-Up	Route		FL		Assigned Delay
			BoB	Kabul	BoB	Kabul	
AC1	WSSS	1000UTC	L759	L750	280	310	0 *(60)*
AC2	WSSS	1015UTC	L759	L750	280	310	15 *(10)*
						350	15 *(10)*
	WSSS	1000UTC	M770	N644	280	310	0 *(60)*

Bay of Bengal Cooperative Air Traffic Flow Management Advisory System (BOBCAT)

Maximum Acceptable Delay

Part 2

Presented by ***AEROTHAI***

Flight Slot Request – AC1

AC1 Choice	Departure	Wheels-Up	Route		FL		MAD
			BoB	Kabul	BoB	Kabul	
1	WSSS	1000UTC	L759	L750	280	310	60
						350	60
2	WSSS	1000UTC	M770	N644	280	310	60
						350	60
3	WSSS	1000UTC	P628	G792 V390	280	310	90
						350	90

Flight Slot Request – AC3

AC3 Choice	Departure	Wheels-Up	Route		FL		MAD
			BoB	Kabul	BoB	Kabul	
1	WSSS	1010UTC	L759	L750	280	310	10
						350	10
2	WSSS	1010UTC	M770	N644	280	310	60
						350	60
3	WSSS	1010UTC	P628	G792 V390	280	310	90
						350	90

Allocation Scenario 1

Aircraft	DEP	Wheels-Up	Route		FL		Assigned Delay
			BoB	Kabul	BoB	Kabul	
AC1	WSSS	1000UTC	L759	L750	280	310	0 *(60)*
AC3	WSSS	1015UTC	L759	L750	280	310	5 *(10)*

Allocation Scenario 2

Aircraft	DEP	Wheels-Up	Route		FL		Assigned Delay
			BoB	Kabul	BoB	Kabul	
AC3	WSSS	1010UTC	L759	L750	280	310	0 *(10)*
AC1	WSSS	1025UTC	L759	L750	280	310	25 *(60)*

Bay of Bengal Cooperative Air Traffic Flow Management Advisory System (BOBCAT)

Trade-Off between Random Slot Allocation Process and Overall Airspace Utilization

Presented by ***AEROTHAI***

Flight Slot Request

AC4 Choice	Departure	Route		FL		Kabul Entry	MAD
		BoB	Kabul	BoB	Kabul		
1	WSSS	L759	L750	280	310	2000UTC	60
					350		60

AC5 Choice	Departure	Route		FL		Kabul Entry	MAD
		BoB	Kabul	BoB	Kabul		
1	WSSS	L759	L750	280	310	2005UTC	60
					350		60

Flight Slot Request

AC6 Choice	Departure	Route		FL		Kabul Entry	MAD
		BoB	Kabul	BoB	Kabul		
1	WSSS	L759	L750	280	310	2015UTC	60
					350		60

Allocation Scenario 1

Aircraft	DEP	Route		FL		Assigned Kabul Entry	Assigned Delay
		BoB	Kabul	BoB	Kabul		
AC4	WSSS	L759	L750	280	310	2000UTC	0 *(60)*
AC5	WSSS	L759	L750	280	310	2015UTC	10 *(60)*
AC6	WSSS	L759	L750	280	310	2030UTC	15 *(60)*

Allocation Scenario 3

Aircraft	DEP	Route		FL		Assigned Kabul Entry	Assigned Delay
		BoB	Kabul	BoB	Kabul		
AC5	WSSS	L759	L750	280	310	2005UTC	0 *(60)*
AC4	WSSS	L759	L750	280	310	2020UTC	20 *(60)*
AC6	WSSS	L759	L750	280	310	2035UTC	20 *(60)*

Allocation Scenario 4

Aircraft	DEP	Route		FL		Assigned Kabul Entry	Assigned Delay
		BoB	Kabul	BoB	Kabul		
AC5	WSSS	L759	L750	280	310	2005UTC	0 *(60)*
AC6	WSSS	L759	L750	280	310	2020UTC	5 *(60)*
AC4	WSSS	L759	L750	280	310	2035UTC	35 *(60)*

Allocation Scenario 5

Aircraft	DEP	Route		FL		Assigned Kabul Entry	Assigned Delay
		BoB	Kabul	BoB	Kabul		
AC6	WSSS	L759	L750	280	310	2015UTC	0 *(60)*
AC4	WSSS	L759	L750	280	310	2000UTC	0 *(60)*
AC5	WSSS	L759	L750	280	310	2030UTC	25 *(60)*

Bay of Bengal Cooperative Air Traffic Flow Management Advisory System (BOBCAT)

BOBCAT Allocation Other Scenarios

Presented by ***AEROTHAI***

Allocation Summary

Aircraft Sequence	Delay Suffered at Kabul Entry			Total Delay Suffered	Next Available Time
	AC4	AC5	AC6		
AC4 - AC5 - AC6	0	10	15	25	20:45UTC
AC4 - AC6 - AC5	0	0	25	25	20:45UTC
AC5 - AC4 - AC6	20	0	20	40	20:50UTC
AC5 - AC6 - AC4	35	0	5	40	20:50UTC
AC6 - AC4 - AC5	0	25	0	25	20:45UTC
AC6 - AC4 - AC5	0	25	0	25	20:45UTC

Thank You!

BOBCAT

Flow Management Advisory System

Development Team

Presented by AEROTHAI

CONCEPT OF OPERATION

BAY OF BENGAL COOPERATIVE ATFM ADVISORY SYSTEM (BOBCAT)

Presented by AEROTHAI

Draft Version 2.1

Bay of Bengal Cooperative ATFM Advisory System (BOBCAT)
Concept of Operation

1. OVERVIEW

1.1 This paper delineates the AEROTHAI Bay of Bengal Cooperative ATFM Advisory System (BOBCAT), which has been conceived and developed to manage air traffic transiting the Kabul FIR by taking into account constraints of key gateway points and route segments aircrafts transit while in en-route to the Kabul FIR. In perspective, these gateway points and route segments are resources that need to be rationed out in time, so as to satisfy minimum spacing requirements of those route segments.

1.2 Airline dispatchers will be able to request multiple choices of gateway point arrival times and route segment flight level sequences which an aircraft prefers to use in transit to Kabul FIR several hours ahead of actual entry time into Kabul FIR through a secure Internet connection. After an agreed cutoff time for inputting requests, BOBCAT processes requests from airlines and notifies airline dispatchers of their assigned estimated Wheels-Up time, estimated time over (ETO) on each gateway point and flight level to be used in transit between gateway points.

1.3 Airline dispatchers of flights that have not been assigned slots of gateway ETO and flight level from their requests will be provided with suggestions of available routes the flight can transit based on availability of slots within the system. Air Navigation Service Providers (ANSPs) would have the capability to securely login to the system to view results of all slot allocations, in addition to viewing past slot allocation result. In the meantime, system ATFMU Specialist operating BOBCAT would have a similar capacity to ANSPs in viewing results of slot assignments. In addition, on request from dispatchers, other functions could also be performed.

2. INTRODUCTION

2.1 While the recent introduction of RVSM and EMARSSH dramatically increased airspace capacity of India, airspace capacity over Kabul FIR remained unchanged. This situation caused some aircraft transiting to Kabul FIR to be redirected into Iran FIR due to insufficient spacing. Aircraft rerouting in the region has financial implications to airlines which may require unscheduled technical stops, causing delays as well as subsequent financial penalties.

Table 1: Traffic statistics through Kabul FIR
3 April 2005 – 9 April 2005, 1900UTC – 2359UTC

Date	G792/ V390	L750	N644	A466	Total
3 April 2005	4	14	19	2	39
4 April 2005	10	9	15	9	43
5 April 2005	1	16	17	3	37
6 April 2005	0	23	24	7	54
7 April 2005	0	26	19	8	53
8 April 2005	0	16	25	9	50
9 April 2005	2	13	17	12	44
Total	**17**	**117**	**136**	**50**	**320**

2.2 In analyzing the problem, statistics from Lahore FIR giving breakup of aircraft using the four available routes through Kabul FIR between 3 April 2005 and 9 April 2005 has been collected (See Table 1). The statistic from the study shows excess use of routes L750 and N644, while route G792/V390 and A466 were less used. This could imply that episodes of aircraft reroutes and unscheduled technical stops were actually caused by uncoordinated air traffic flow into the Kabul FIR.

2.3 The AEROTHAI Bay of Bengal Cooperative ATFM Advisory System (BOBCAT) has been conceived to solve the problem of transiting the Kabul FIR by taking into account constraints of key gateway points and route segments while in transit to Kabul FIR. In perspective, these gateway points and route segments are resources that need to be rationed out in time, so as to satisfy minimum spacing requirements along those route segments. In rationing these resources, we believe that flights choosing to transit less congested route segments even if the route is requested as their alternate routes exhibit flexibility in aircraft's request.

2.4 Within the context of the BOBCAT, airline dispatchers will be able to request multiple choices of gateway point arrival and route segment flight levels to use in planning en route and in transit through the Kabul FIR several hours ahead of actual entry time into Kabul FIR for each flight transiting Kabul FIR. After an agreed cutoff time for inputting requests, BOBCAT processes requests from airlines and notifies airline dispatchers of their assigned ETO on each gateway point and flight level used in transit between gateway points. At this time, aircrafts that have not been assigned slots of gateway ETO and flight level from their requests will be provided with suggestions of available routes the flight can transit based on availability of slots within the system. Airline dispatchers who are not satisfied with their assignment can also cancel their requests and request new slot assignment based on availability.

2.5 In the meantime, ANSPs with gateway points within their area of responsibility could also login to the system to view results of slot allocations for aircrafts in transit to Kabul FIR, in order to plan their air traffic management.

2.6 BOBCAT would be run by an ATFMU Specialist who will coordinate with ANSPs concerned in cases where an adjustment of flow properties of each route segment is required.

3. THEORY OF OPERATIONS

3.1 The BOBCAT operation is divided into three phases:

- *Slot Request Submission:* Airline dispatchers log into the system to submit slot requests for flights transiting into Kabul FIR within the timeframe to be agreed on, either based on previous slot requests saved in the system or based on new set of requests. At the time of request submission, each request is scored individually according to policy stated in Section 3.2.

- *Cut-off Time Slot Allocation:* After the agreed cut-off time arrives, BOBCAT automatically processes all slot requests within the timeframe and assign slots to requesting flights based on policy and algorithm stated in Section 3.3.

- *Post-Cut-off Time Slot Selection:* After slot assignment has been made, airline dispatchers whose flights were not assigned slots or were unable to request slot prior to the cut-off time will log into the BOBCAT system to request slot assignment based on real-time availability. The assignment policy is stated in Section 3.10.

Slot Request Submission

3.2 BOBCAT accepts slot requests from airline dispatchers and structures the information in the form shown in Figure 1.

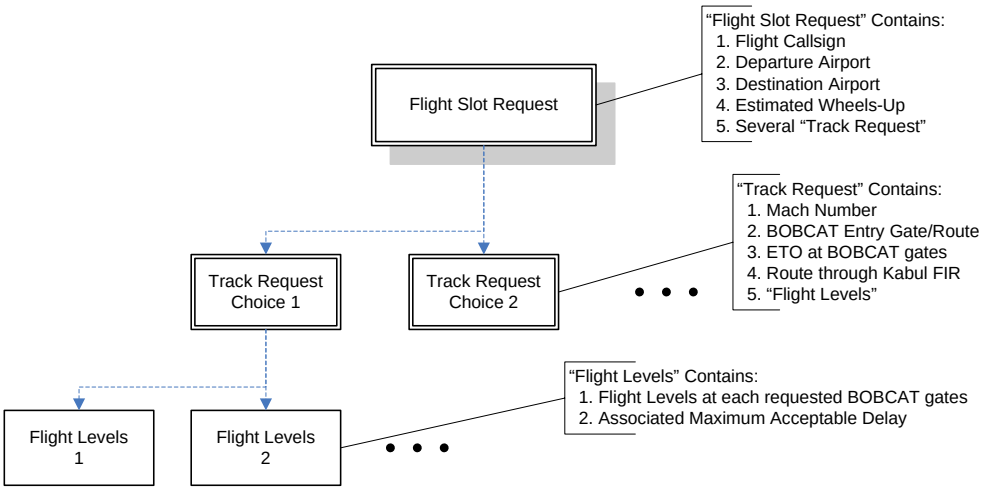


Figure 1: BOBCAT Flight Slot Request structure

3.3 During the time when airline dispatcher submits each flight's alternate route, scoring of each planned route will be randomized by a random number generator. All route requests are then saved into the BOBCAT's request database for appropriate cutoff-time slot assignment.

Cutoff-Time Slot Allocation

3.4 Once the cut-off time arrives, BOBCAT would gather all of the slot requests and rank the slot requests by scores each of the requests was assigned when airline operators submit flight requests into the system.

3.5 BOBCAT then further optimizes the slot assignment by filtering the slot requests for requests that are spaced from other slot requests that are spaced substantially apart from other requests at every important gate. These requests are characterized by spacing from other aircraft within the region being more than half the sum of required spacing and wheels-up buffer. Priority (+1) is given to these flights so that they are allocated slots before requests closer to other requests, which would enable more effective use of the airspace.

3.6 In addition to request spacing considerations, flights originating from Indian and Pakistani airports requesting FL280 will be given priority (+1) over others by modification of the random scoring. Retrospectively, flights originating from airports in the region requesting FL300 and above will be given a lower priority (-1) relative to other flight requests.

3.7 Having been prioritized, requests will be sorted in random score and priority given and processed sequentially by BOBCAT. Slot requests will then be placed into the system in order of priority and random scoring. BOBCAT will ensure that aircraft spacing within the traffic flow will not be lesser than the sum of spacing required by ANSPs and wheels-up buffer time agreed upon by ATFM/TF.

3.8 If an entire flight level sequence of a planned track is allocated slots within given Maximum Delay, other profiles associated with the track and other tracks requested by the flight will be discarded.

3.9 If maximum delay parameter cannot be satisfied, next choice of flight level sequence will be considered by BOBCAT, discarding changes made for the previous flight profiles. In the case that there is no more flight profile left to be considered for the track requested, the track request is marked as processed but cannot be allocated.

3.10 BOBCAT Slot allocation process can also be delineated in the form of Flow Chart as in Figure 2.

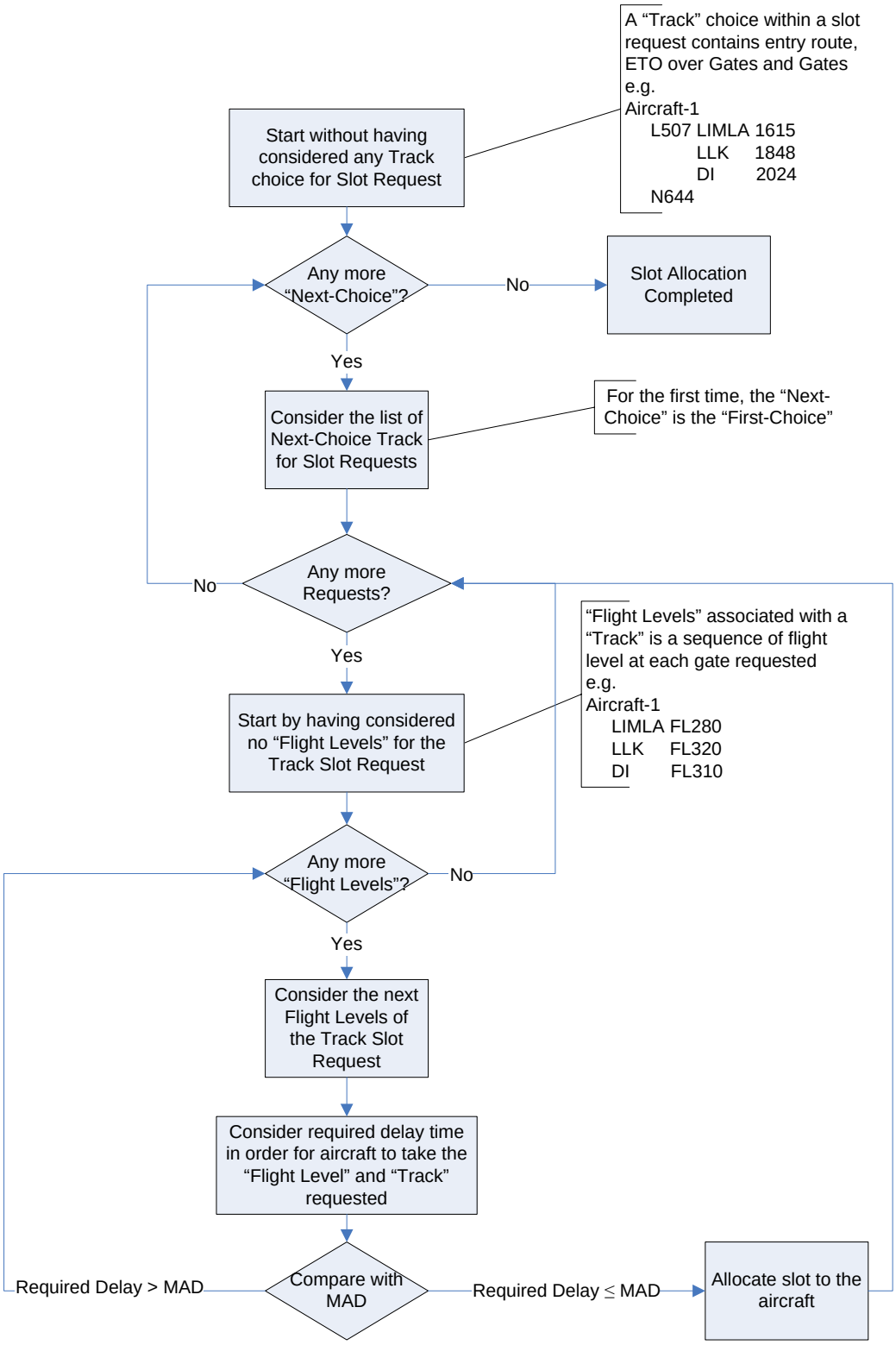


Figure 2: BOBCAT Slot Allocation Mechanism

3.11 This process continues until all track requests have been either discarded or processed. After slot allocation is completed, the system notifies all related

stakeholders such as airline dispatchers of each requesting flights, ANSPs and ATFMU Specialist of the results.

Post-Cutoff Time Slot Selection

3.12 Once the cutoff-time for slot assignment has passed and slot assignment has been performed on requests submitted before the cutoff-time, BOBCAT allows airline dispatchers to login to the system to re-request slot assignment based on real-time slot availability.

3.13 Airline dispatchers can login to view details of flights' allocated slots. Slot allocation will be visible to all stakeholders accessing the system.

3.14 If airline dispatchers are not satisfied with slot allocated, he has an option of viewing reservation list at each gate and select new slot based on his previous requested tracks or a new track.

3.15 Airline dispatchers of flights which were not assigned requested routes would also be shown suggested delay for each alternate route requests previously submitted for the flight.

4. SYSTEM FUNCTIONALITY AND REQUIREMENTS

4.1 BOBCAT should have the following functionalities:

- There is no limitations on the number of tracks (a series of gate times traversed by a flight) a dispatchers can input into BOBCAT.
- Airline dispatchers can input up 20 flight level sequence (sequence of flight level associated with a track request) corresponding to each track requested for a flight.
- Automatically checks airline dispatchers' request input for values such as time.
- Automatically checks flight callsign's uniqueness.
- Allows an airline dispatcher to request slot for flights he is responsible for.
- Spacing of flights en route between gateways can be metered as per ANSPs' requirements.
- Mach number technique on both faster aircraft in the back and faster aircraft in the front implemented to ensure metered spacing would be available for use at the end of a route segment.
- Gates, flight level, spacing metering for all gateways can be configured in real-time prior to slot allocation.
- Gates can be added, removed or modified dynamically.

- System-wide Wheels-Up Buffer Time can be configurable.

4.2 Meanwhile, it has the following requirements:

- Records of airline request and assignment will need to be kept for at least 30 days.
- Airline dispatchers need to be able to enter flight requests into the system from a simple user interface.
- Airline dispatchers need to be notified of results of gateway slots he is allocated.
- ANSPs need to be able to view slot allocation results related to his operation.
- Flights departing from Indian and Pakistani airports wishing to transit FL280 will be given a higher priority (+1) over flights from other airports, while aircraft from the same airport wishing to transit FL300 or above will be given lower priority (-1) for transit through BOBCAT
- BOBCAT shall provide Wheels-Up Buffer Time after assigned Wheels-Up Time within which aircraft can depart without having to make arrangements for new slot time.

5. USER INTERFACES

5.1 BOBCAT interacts with three different groups of users: airline dispatchers, ANSPs and ATFMU Specialist. Interaction with these groups is delineated in Sections 5.2, 5.11, and 5.14 respectively.

Airline Dispatchers

5.2 Several hours prior to an agreed cutoff time, airline dispatchers can securely login to the BOBCAT web interface to submit slot requests for gateway point/route segment flight level while in transit to Kabul FIR.

5.3 As well as aircrafts transiting Kabul FIR, other aircrafts departing from Southeast Asian or East Asian airports which also use prime en-route airways through India and Pakistan being used by Kabul traffic during the time of operation of the ATFMU will also need to join slot allocation scheme.

5.4 Several key information pertinent to airline dispatcher's slot request decision such as an overview of results from last slot assignment will be shown at login time. A home screen after a dispatcher's logon is shown in Figure 3.

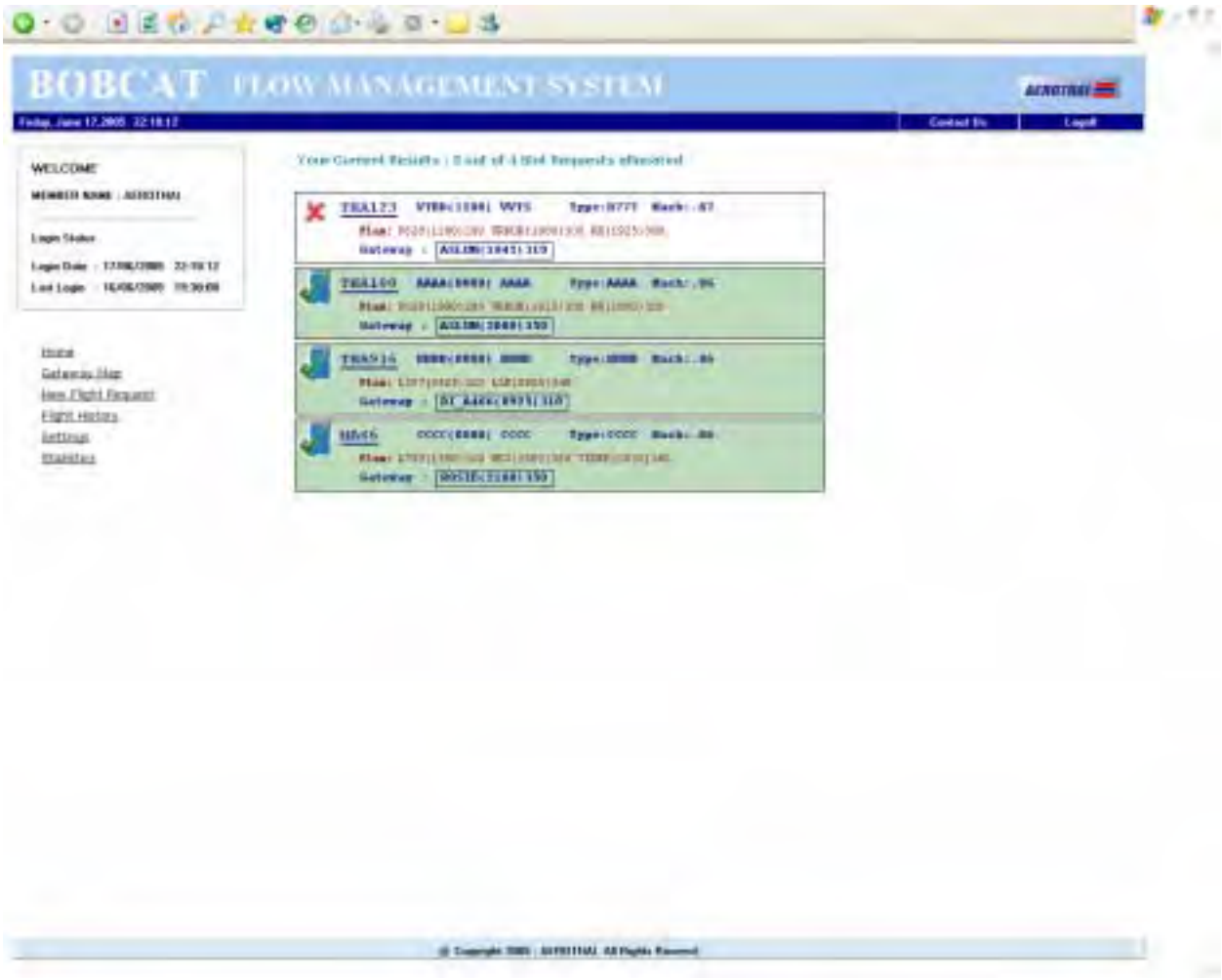


Figure 3: Airline dispatcher default screen after successful logon into BOBCAT

5.5 The user interface for requesting gateway point/route segment is shown in Figure 4.

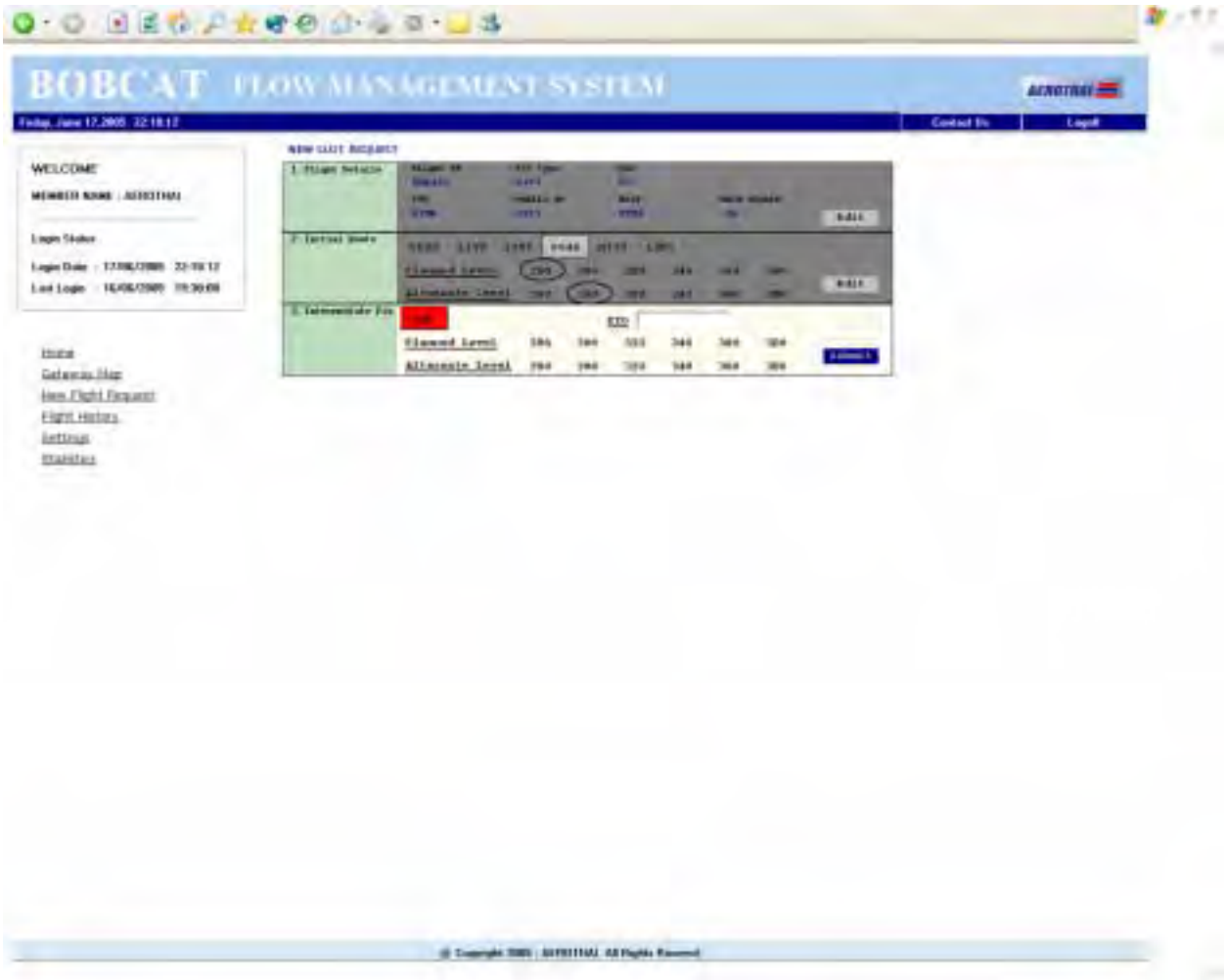


Figure 4: BOBCAT User Interface for requesting gateway point/route segment set

5.6 Since flights scheduled by airlines are most likely recurring flights, BOBCAT facilitates storing submitted requests as flight route template so that airline dispatchers can later call up a particular sequence of slot requests to edit and use as slot request for another flight in the future. Flight route template storage screen is shown in Figure 5.

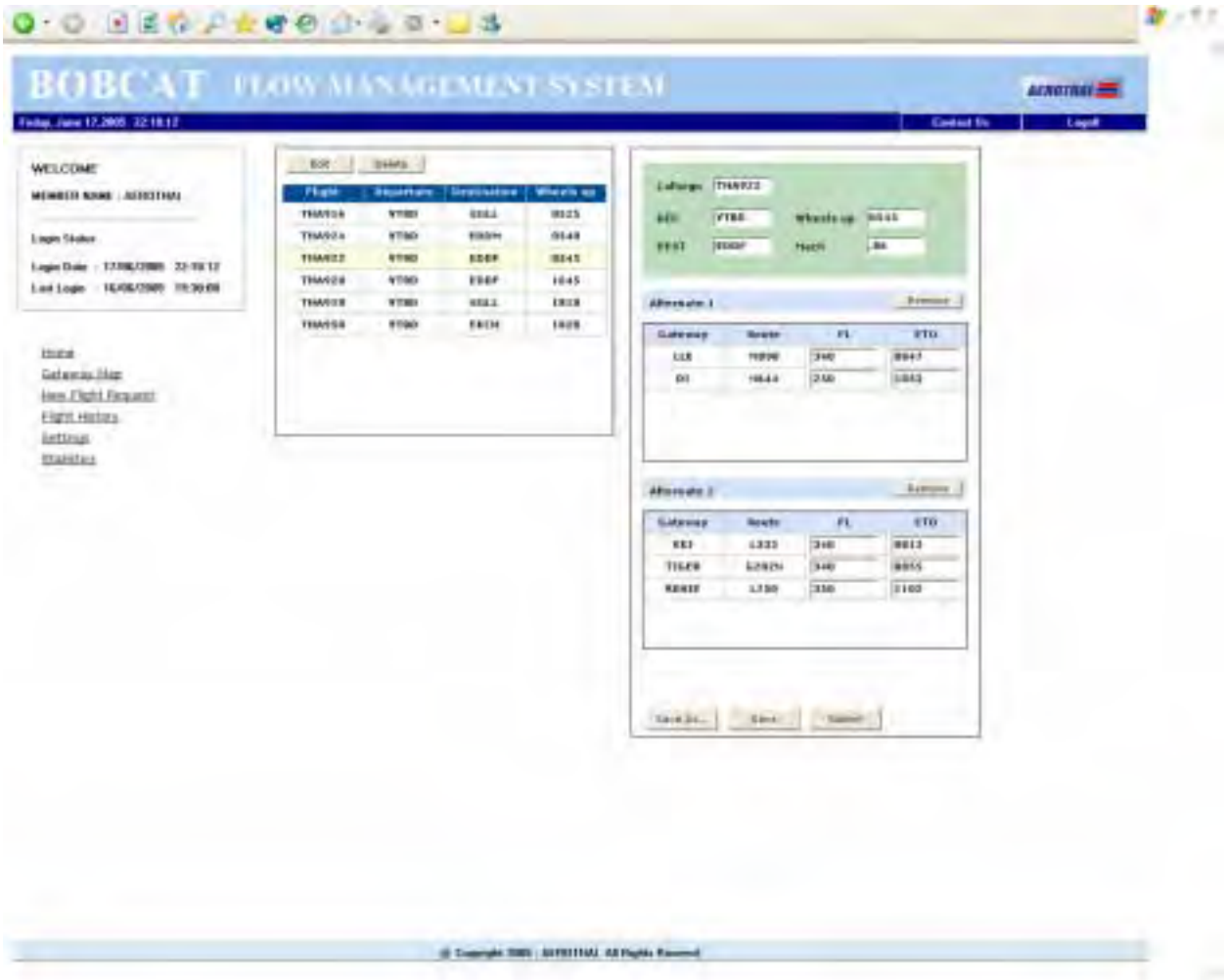


Figure 5: BOBCAT User Interface for flight route templates

5.7 Once the cutoff time for slot request submission is over, BOBCAT would stop accepting slot requests for the concerning period of time, while BOBCAT processes slot assignments for all requesting flights. Each airline dispatcher would be notified via some form of communication such as e-mail or notification message when slot assignment is completed. If a flight is not assigned a set of slots, BOBCAT would suggest possible routes which could include suggesting delays on previously requested routes. Future revision of BOBCAT would also suggest several other available routes for the airline dispatchers to choose.

5.8 Airline dispatchers whose flights were not assigned slots or were dissatisfied with the allocated slots can then request slot assignment based on real-time availability of gateway slots. A screen showing real-time on-demand slot assignment is shown in Figure 6.

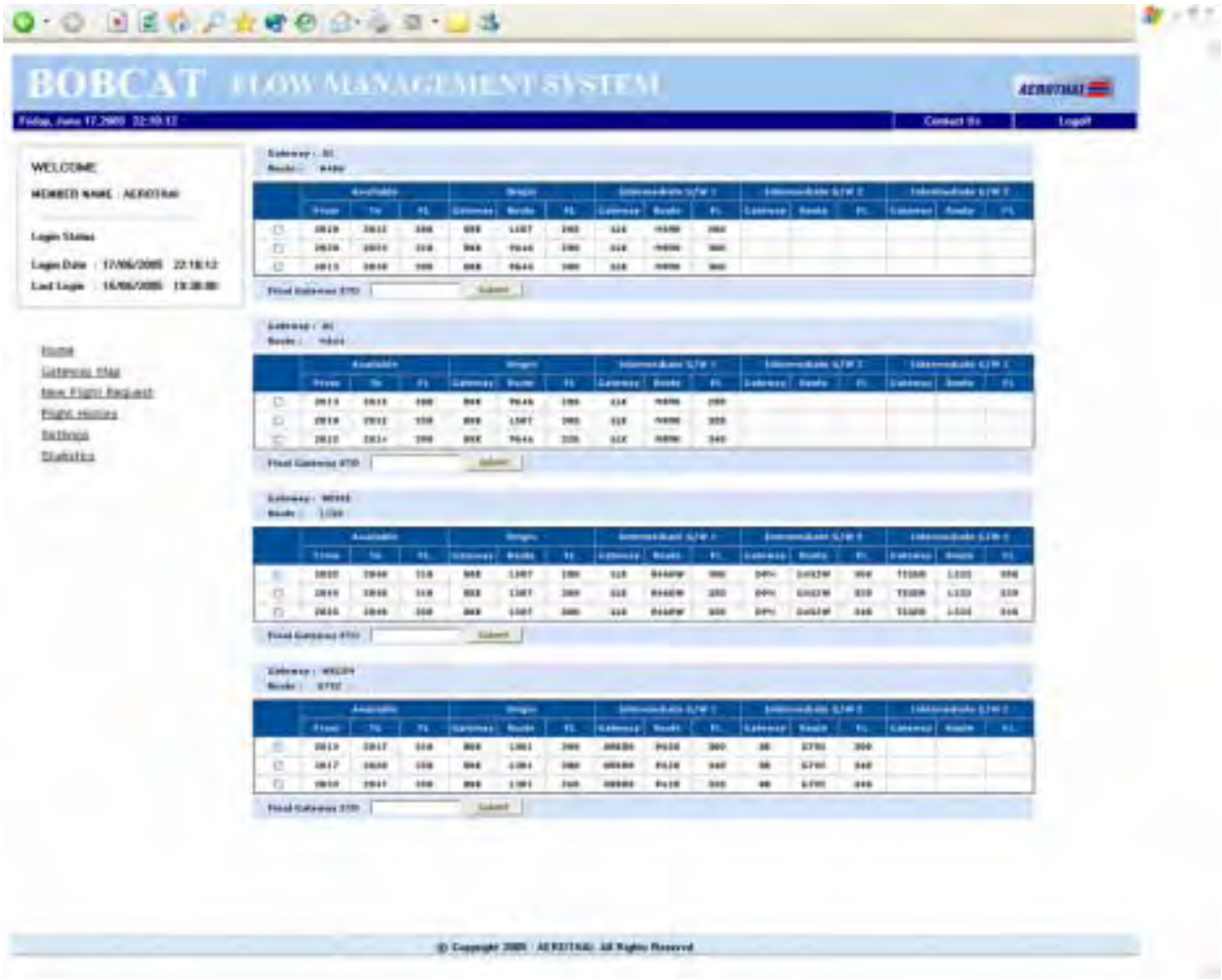


Figure 6: BOBCAT Real-time on-demand slot assignment after respective cut-off time as passed

5.9 If an airline dispatcher is still dissatisfied with the results, he could also contact ATFMU Specialist responsible for running the BOBCAT.

5.10 Once airline dispatchers receive slot allocations, they will submit flight plans based on those slot allocations and those flight plans will be transmitted to ATFMU AFTN address.

ANSPs

5.11 ANSPs would have capability to securely login to the system to view results of each slot allocation, in addition to viewing past slot allocation result. Once an Air Traffic Controller (ATC) login to the system, he would be shown the summary result of the most recent slot allocation. A screen of ANSPs login is shown in Figure 7.

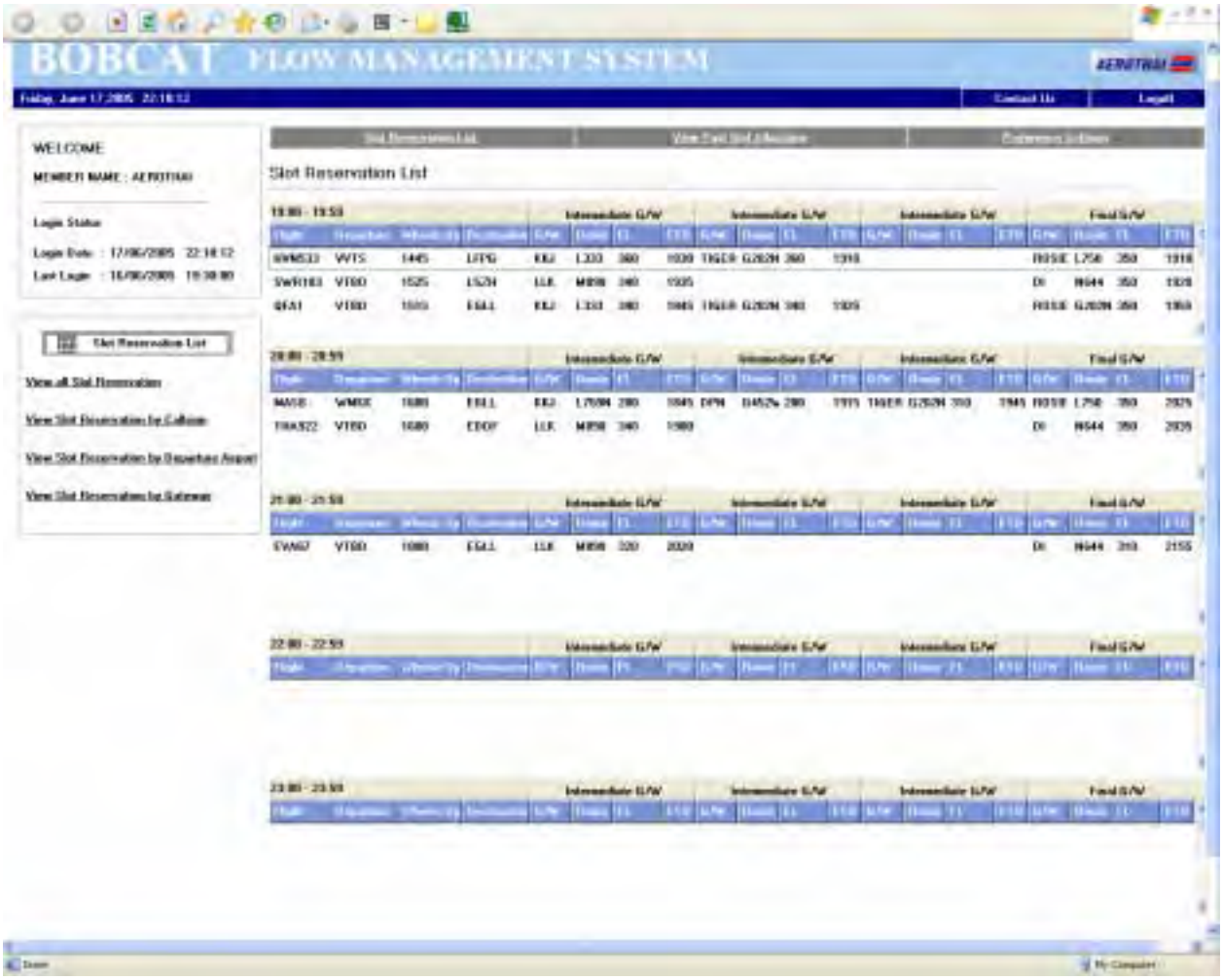


Figure 7: ANSP default screen after successful logon into BOBCAT

5.12 Details of the most recent slot allocation could also be viewed by simply searching for related such as searching for slot allocations of aircrafts that would be transiting some certain gateway points. A search result window for a slot allocation is shown in Figure 8.

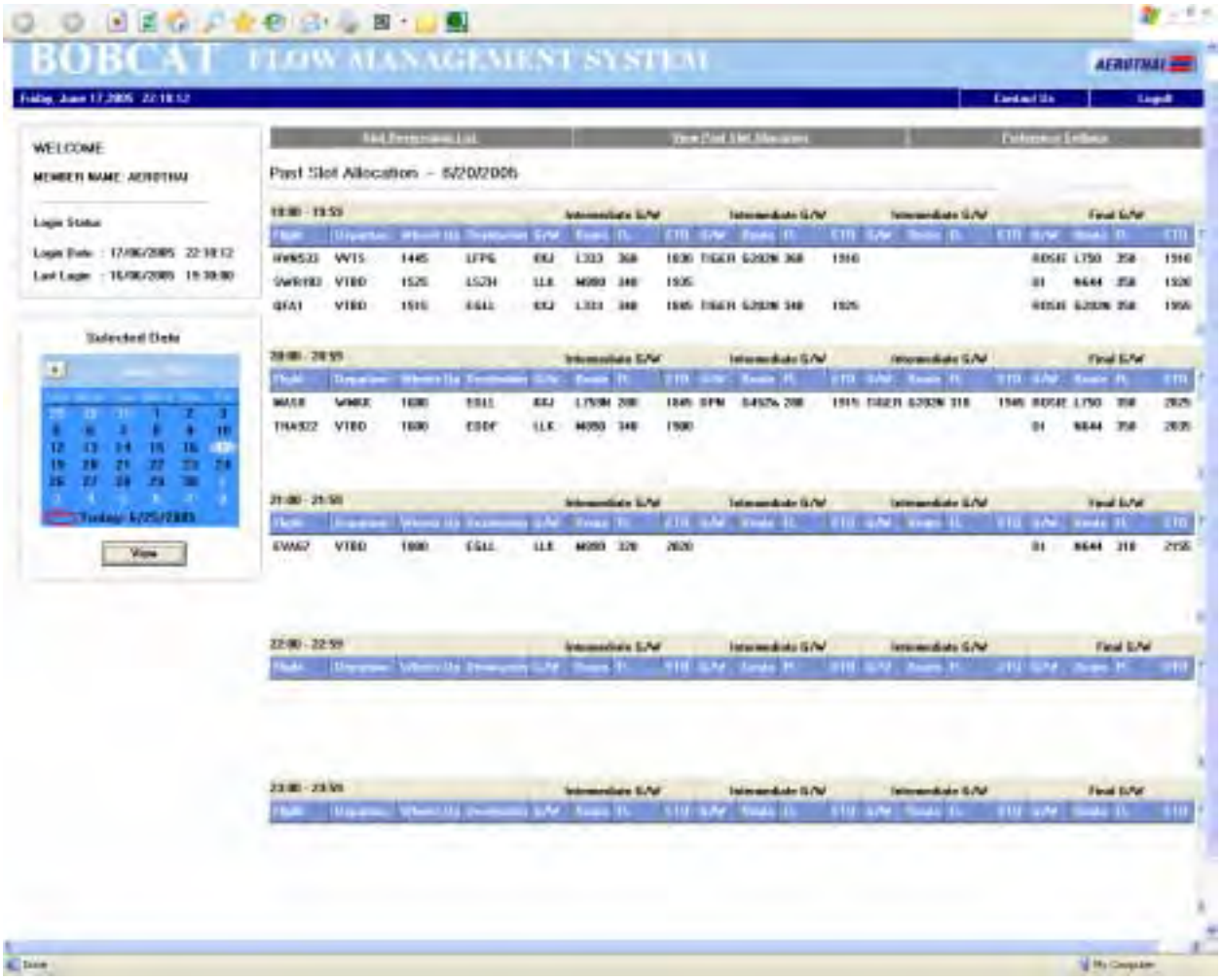


Figure 8: ANSP screen showing search parameters and results of search for relevant slot allocation results at a gateway point

ATFMU Specialist

5.13 The ATFMU Specialist managing BOBCAT would have similar capacity to ANSPs in viewing results of slot assignments. Furthermore, the ATFMU Specialist would also have the capability to modify slot assignments given that the minimum spacing is not violated. The ATFMU Specialist will also be responsible for coordinating with ANSPs in the Bay of Bengal regions to meter traffic incoming to any gateway points, .i.e. modifying minimum spacing property of each route segment within the system as well as modifying route segment flight level/gateway points within the system. Screen in Figure 9 shows ATFMU Specialist home portal page after login, which displays status of previous slot allocation as well as menu for other possible administrative options.

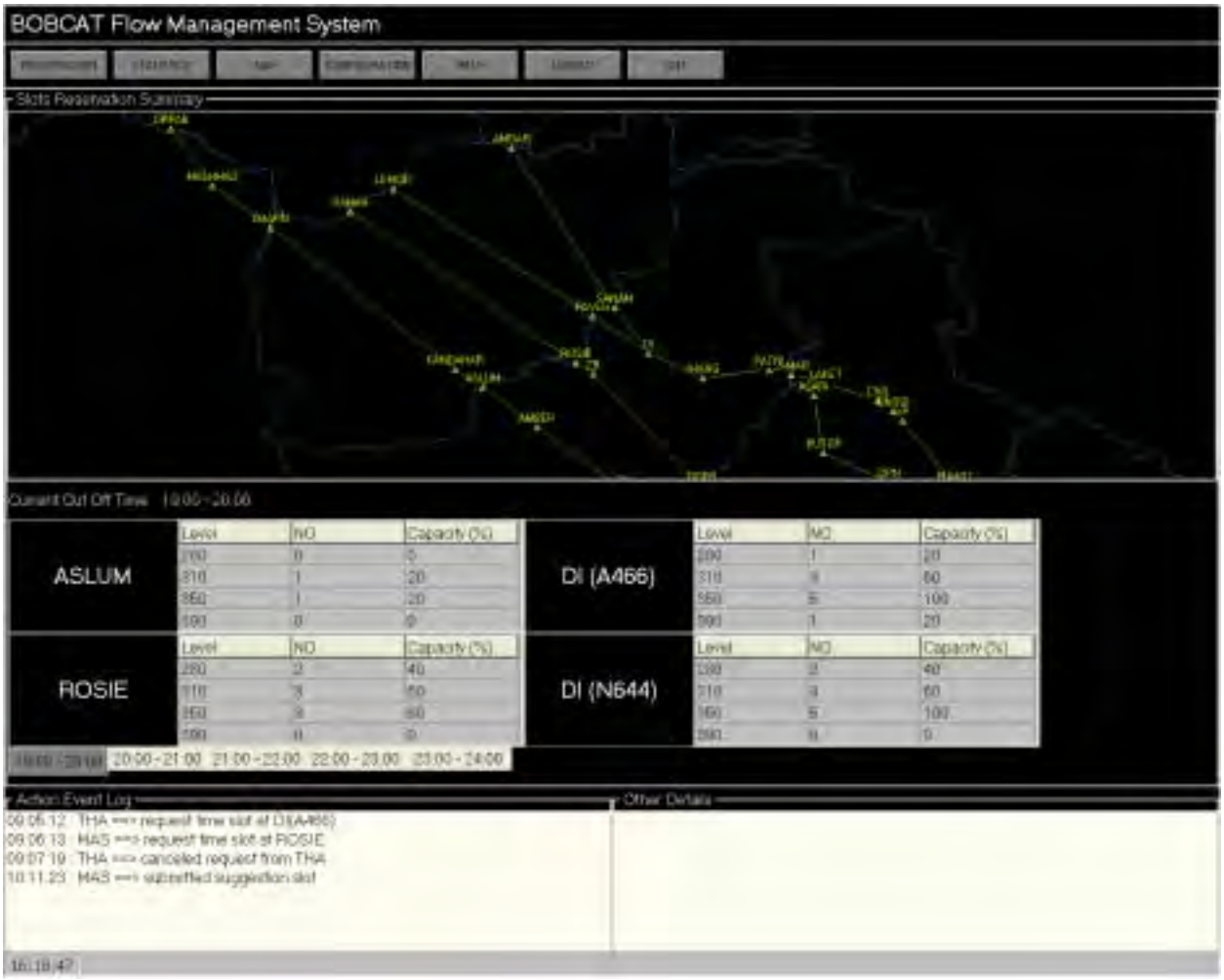


Figure 9: ATFMU Specialist default screen after successful logon into BOBCAT

5.14 The screen in Figure 10 shows possibility of the ATFMU Specialist configuring a gateway point/route segment, which allows the change in minimum spacing, adding/removing available flight levels of the route segment, in addition to adding/removing an entire gateway point/route segment.

Figure 10: ATFMU Specialist screen for configuring a gateway point/route segment

5.15 In addition to results of slot assignments, the ATFMU Specialist would also be able to view hardware operational status and be alerted once a part of the operating hardware is no longer operational. In most case, the responsible engineer would already have been notified of the equipment failure.

6. ROLE OF THE AIR TRAFFIC FLOW MANAGEMENT UNIT (ATFMU)

6.1 BOBCAT will function as the Air Traffic Flow Management Unit for flights passing through Kabul FIR and flights that operate through airway segments leading to Kabul FIR such as L507, M770, and P646 in the portion between Bangkok, Kuala Lumpur, and Singapore FIR, regardless of the departure location and destination.

6.2 Dispatchers of aircrafts departing from any airports and traversing primary routes used for transit region would be required to log into BOBCAT to request slot assignment for flight level assignment on route segments/gateway points before the agreed cut-off time. Afterwards, BOBCAT would process requests for flights and notify users of the result. Dissatisfied users or dispatchers of aircrafts that

were not able to request for slot allocation would request slot assignment in real-time based on available slots after slot allocation is executed.

6.3 Dispatchers of aircrafts departing from any airports and traversing primary routes used for transit region would be required to log into BOBCAT to request slot assignment for flight level assignment on route segments/gateway points before the agreed cut-off time. Afterwards, BOBCAT would process requests for flights and notify users of the result. Dissatisfied users or dispatchers of aircrafts that were not able to request for slot allocation would request slot assignment in real-time based on available slots after slot allocation is executed.

6.4 BOBCAT will play a key role in smoothing air traffic from Thailand, Singapore and Kuala Lumpur through Kabul FIR by advising wheels-up time, ETO at key gateway points and cruising flight level through them to ensure that aircraft entering Kabul FIR does not exceed the airspace capacity there. Airline operators are responsible for following the advice given by BOBCAT.

7. REQUIRED RESOURCES

Hardware Requirements

ATFMU Requirements

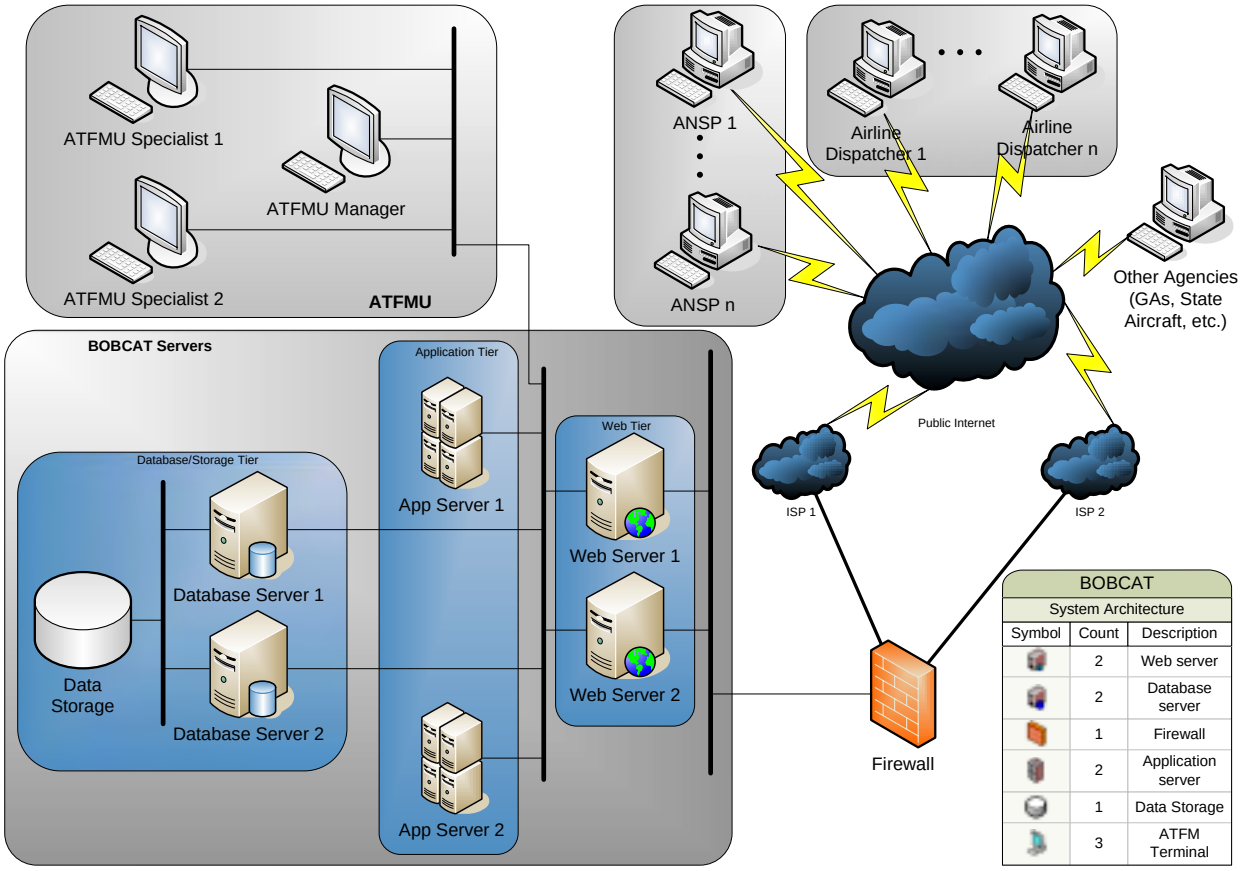


Figure 11: BOBCAT System Architecture

7.1 BOBCAT consists of two Web Servers, two Application Servers and two Database Servers in addition to Database Server. Web Servers will house Web-based Interface for Airline Dispatchers, ANSPs and services for ATFMU Specialist. Application Servers will contain slot allocation services and other business logic related to BOBCAT. Database Servers will house software for managing BOBCAT database, stored on external Data Storage. The overall BOBCAT system architecture is shown in Figure 11.

7.2 Web Servers and Application Servers will be operated in a "load-balancing" mode so that all four servers will be operational simultaneously. In the case that a Web Server becomes unavailable, the other takes over service. This type of recovery also applies for Application Servers. Database Servers will run in an Active/Standby mode so that if the core Database Server becomes unavailable, the standby server takes over service. Backup and Restore routines will be built-in so that database will be backed up.

7.3 Security measures will also be in place to shield Application Servers and Database Servers from contacts and attacks from the public Internet. Web Servers will be the only set of servers users from the public Internet will be able to contact.

7.4 Any contacts from ANSPs, Airline Dispatchers or other agencies (GA's, State Aircrafts, etc.) will be directed to one of BOBCAT Web Servers depending on loads among the two. Responsible Web Servers will ask one of the BOBCAT Application Servers for services related to BOBCAT. These services would then require inquiry of the active Database Server by responsible Application Server.

7.5 Two ATFMU Specialist Terminals are provided for ATFMU Specialist at the ATFMU, in addition to a terminal for ATFMU Manager. These terminals will be able to access BOBCAT through Application Servers tier.

Airline Dispatchers and ANSPs Requirements

7.6 Airline dispatcher users and ANSP users connect to BOBCAT via public Internet using equipments that satisfy the following requirements:

- A Personal Computer of any operating system with the following characteristics
  - Processor: minimum CPU clock speed of 150 MHz
  - Operating System: Any that operates one of the following web browsers (i.e. Windows 2000/XP, Linux, Unix, or Mac OS)
  - RAM: 128 MB or larger (depending on operation system)
  - Harddisk Space: minimum of 500 MB or larger (depending on operating system)
  - Monitor Display Resolution: Minimum of 1024 x 768 pixels
  - Web Browser: Internet Explorer 5.5 or newer, Mozilla 1.0 or newer, Mozilla Firefox 1.0 or newer, Netscape 7 or newer
- Internet Connection : 56 Kbps Modem or faster Internet connection

Manpower Requirements

7.7 Operation of BOBCAT requires at least the following personnel:

- Qualified and trained air traffic controllers to operate BOBCAT as ATFMU Specialists
- Qualified and trained engineers to maintain BOBCAT

8. HOURS OF OPERATION

8.1 BOBCAT Servers will be operational 24 hours daily, while it will be responsible for aircrafts entering Kabul FIR between 1900UTC and 2359UTC each day. However, the ATFMU will only be operational between two hours prior to the agreed cut-off time until all aircraft who have applied for slot allocations within BOBCAT are airborne.

8.2 The cut-off time for submitting slot requests is to be determined after the Paper Trial of BOBCAT.

9. COMMUNICATIONS REQUIREMENTS BETWEEN ATFMU AND USERS

9.1 The ATFMU Specialist will be provided with two dedicated phone lines, two dedicated fax, e-mail addressing and dedicated AFTN address for communications ANSPs and dispatchers as necessary (VTBBZDZX).

10. COOPERATIVE REQUIREMENTS BETWEEN STATES CONCERNED, AIRLINES AND THE ATFMU

10.1 Cooperative requirements between states concerned, airlines and ATFMU will be considered at ATFM/TF/3 meeting.

11. REFERENCES

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VTBB

DATE	A/C	Type	Dep AD	Dest	ETD	ATD	ROUTE	FIX	ATO	FL	PLN FL
							L507	LIMLA			
							P646	BETNO			
							L515/M770	TAVUN			
							L759	IKULA			

WMFC

DATE	A/C	Type	Dep AD	Dest	ETD	ATD	ROUTE	FIX	ATO	FL	PLN FL
							P628	VPL			
							L759				
							L515/M770				

WSSS

DATE	A/C	Type	Dep AD	Dest	ETD	ATD	PLN ROUTE	PLN FL
							L759	
							L515/M770	
							P628	

INDIA	**GATES**	***JJS***	***KKJ***	***TIGER***	***RK***	***LLK***	***DPN***	***SAMAR***

DATE	A/C	Type	Dep AD	Dest	ETD	ATD	FIX1	ATO	FL	PLN FL	FIX2	ATO	FL	PLN FL	FIX3	ATO	FL	PLN FL	FIX4	ATO	FL	PLN FL
							JJS				LLK				DPN				SAMAR			
							JJS				LLK				DPN				TIGER			
							LLK				DPN				SAMAR							
							LLK				DPN				TIGER							

DATE	A/C	Type	Dep AD	Dest	ETD	ATD	FIX1	ATO	FL	PLN FL	FIX2	ATO	FL	PLN FL	FIX3	ATO	FL	PLN FL	FIX4	ATO	FL	PLN FL
							JJS				KKJ				TIGER							
							JJS				KKJ				DPN				SAMAR			
							KKJ				TIGER											
							KKJ				DPN				SAMAR							

DATE	A/C	Type	Dep AD	Dest	ETD	ATD	FIX1	ATO	FL	PLN FL
							RK			

OPKC

DATE	A/C	Type	Dep AD	Dest	ETD	ATD	ROUTE	FIX	ATO	FL	PLN FL	FIX	ATO	FL	PLN FL
							A466	DI				SITAX			
							N644	DI				PAVLO			

DATE	A/C	Type	Dep AD	Dest	ETD	ATD	ROUTE	FIX	ATO	FL	PLN FL	*NEXT FIX*	*ETO*
							L750	ROSIE				*RANAH*	
							G792/V390	ASLUM				*CHARN*	

Safety Assessment Hazard Log

Operational Trial Implementation of
Bay of Bengal Cooperative Traffic Flow Management System (BOBCAT)

The Bay of Bengal Cooperative Traffic Flow Management System (BOBCAT) is not intended nor designed to "control" aircraft or relieve any of the traffic separation responsibilities of the ATS providers concerned. ATS providers retain full responsibility for all ATS functions, including air traffic collision avoidance. In accordance with Phase One of the ATFM system implementation planning for the Bay of Bengal being coordinated by the Air Traffic Flow Management Task Force (ATFM/TF) of the ICAO Bay of Bengal ATS Coordination Group (BBACG) the purpose of BOBCAT is to regulate, by the calculation and distribution of gateway slot times, the flow of westbound air traffic departing airports from East Asia, South-East Asia and South Asia and which had planned to transit the Kabul FIR between the hours of 1900UTC and 2400UTC daily.

The BOBCAT is an advisory system which does not have executive control of aircraft. Nevertheless, BOBCAT would provide scheduling information for aircraft departures and, if the system did not perform to design expectations, this could lead to traffic congestion. In no case would erroneous advisory information from BOBCAT be anticipated to lead to breakdown of required ATS separation as ATS providers retain responsibility for tactical ATS and traffic management. In this context, the Air Traffic Flow Management Task Force undertook a safety assessment hazard identification activity in preparation for an operational trial of BOBCAT. The following seven hazards and associated mitigators were identified during the hazard identification activities.

	Hazard No 1
Description:	Non-standard, incorrect or corrupt data leading to erroneous advisory information.
Remarks:	The BOBCAT is a computerized system with user access via the public internet. This hazard identifies the possibility of incorrect data being presented to or utilized by BOBCAT, resulting in erroneous advisory information being promulgated by BOBCAT.

Mitigation:	1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management. 2) Hardware – The BOBCAT Concept of Operations includes details of system hardware architecture which incorporates contemporary firewall protection to ensure no unauthorized access is obtained, in particular to application and database servers. 3) Software – incorporates checking algorithms to ensure aircraft can not be scheduled at the same gateway fix at the same time and at the same flight level. 4) Paper Trial – Paper trials/simulations of full functionality of BOBCAT prior to operational trial comprises validation exercises in order to identify data errors and other issues. 5) ATFMU – Structured training programme for ATFMU staff to ensure recognition of non-normal data configurations, and a "reasonableness" check of gateway allocation lists is conducted by ATFMU staff prior to the list being published to users. 6) ATS Unit – The ATS Units adjacent to or controlling gateway fixes would identify situations where traffic was inappropriately sequenced and provide tactical ATS intervention. 7) Shadow/Ghost Operations – Implementation of operational trial will utilize staged implementation of BOBCAT. Stage one (7 day period) would require full functionality and user input, but slots generated would not be issued to aircraft. Facilitates testing of databases and procedures under operational conditions. Stage 2 commences live operations only provided Stage 1 operations are acceptable.
	Hazard No 2
Description:	Errors or bugs in software updates leading to erroneous advisory information.

Remarks:	This hazard identifies concerns in respect of major software changes or other major equipment changes which could result in introduction of catastrophic software threats.
Mitigation:	1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management. 2) Hardware – The BOBCAT Concept of Operations includes details of system hardware architecture which includes duplicated systems throughout enabling redundancy , allows one system to be non operational whilst duplicated system carries the load. 3) Bay of Bengal and South Asia ATFM Handbook includes requirements and procedures for major software updates. Significant system and software changes to be reviewed by suitable oversight authority e.g. Air Traffic Flow Management Task Force, Bay of Bengal ATS Coordination Group, AEROTHAI Senior Engineering Staff prior to implementation 4) Paper trial and shadow/ghost operations provide intensive testing of software.
	Hazard No 3
Description:	Hardware or networking failures or incompatibilities leading to absence of advisory information or promulgation of erroneous advisory information.
Remarks:	Hardware and/or hardware networking problems/public internet failures may create a situation where BOBCAT goes off line without warning, leading to an absence of data or erroneous data presentation to users due lack of update capability. ***Question for AEROTHAI – How will users know when the list was last updated? Does the list remain visible once the internet connection is lost? Is there some way of indicating to users that the list has not been recently updated and therefore is not accurate?***

Mitigation:	1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management. 2) Hardware – The BOBCAT Concept of Operations includes details of system hardware architecture which includes duplicated systems throughout enabling redundancy of hardware without compromising entire BOBCAT system. 3) Bay of Bengal and South Asia ATFM Handbook includes requirements and procedures for internet outage, including manual procedures for contact with ATFMU via telephone, AFTN and fax to allow gateway allocation list to be updated and gateway allocations issued. 4) ATFMU staffing includes provision for technician qualified and trained on all BOBCAT facilities to be on duty during hours of operation of ATFMU. 5) Paper trial and shadow/ghost operations provide intensive testing of system. Shadow/ghost operations allow testing of hardware and networked system under operational conditions.
	Hazard No 4
Description:	Inadequate or inappropriate information entered into the system by users leading to erroneous advisory information.
Remarks:	BOBCAT would have a large number of users, particularly dispatchers from many airlines, interacting with the system. Potential for the “wrong” information to be entered, leading to consequential erroneous data being promulgated by BOBCAT.

Mitigation:	1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management. 2) Two day BOBCAT Workshop (9 & 10 November 2005) for airline dispatchers and affected ATS officers will be conducted during ATFM/TF/4 meeting (7 – 11 November 2005). 3) Bay of Bengal and South Asia ATFM Handbook includes comprehensive requirements and procedures for users of the system. 4) Structured training programme for ATFMU staff to ensure recognition of non-normal data configurations, and a "reasonableness" check of slot allocation lists is conducted by ATFMU staff prior to the list being published to users. 5) BOBCAT software makes extensive use of simplified menus for user selection of data input, limited choices in each menu for routes, levels etc, no ability for users to vary menus or input data other than what is contained in the menus. 6) BOBCAT Concept of Operations includes provisions for security of user access to BOBCAT. Access only via password to authorized users with written approval from ATFMU manager.
	Hazard No 5
Description:	Unforeseen changes in airspace operational status leads to sudden reduction in airspace capacity.
Remarks:	If the airspace operational status changes without due notification e.g. sudden non-availability of an ATS route, it will take some time before BOBCAT can reschedule slots if the sudden change in status occurs prior to the publication of the nightly slot allocation list. If the change in airspace operational status occurs after the slot allocation list has been published, BOBCAT is unable to assist.

Mitigation:	1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management. 2) Sudden changes in operational status that occur prior to the cut off time for the calculation and promulgation of the gateway allocation list can be managed by BOBCAT, e.g. a route that is suddenly not available is removed from the route selections available to users. Users that have already selected the route that is no longer available would be allocated one of their other preferences that did not include this route. 3) In circumstances where the change in operational occurs after the gateway allocation list has already been promulgated would require ATS providers to tactically manage the situation in accordance with ATS contingency plans/procedures.
	Hazard No 6
Description:	Industry does not comply with agreed wheels up and/or gateway fix times leading to congestion and un-flowed traffic sequence.
Remarks:	Inadvertent or willful non compliance by Industry with published wheels up and/or gateway fix times would lead to schedule conflicts at gateway fixes.
Mitigation:	1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management. 2) ICAO PANS ATM (Doc 4444) includes provisions at paragraph 7.8.1 which place responsibility on pilot and operator to ensure that aircraft is ready to taxi in time to meet ATFM requirements. 3) Implementation of flow management provided by BOBCAT is as a result of collaborative arrangements between Bay of Bengal ATS providers and IATA, including IATA member airlines. Industry consultation/liaison with/by IATA and ICAO Regional Office provides increased communications and agreement between users and ATS providers.

	4) AIP Supplement agreed by users and issued by involved States requires compliance by users with gateway slots allocated by BOBCAT. AIP Supplement will highlight importance of meeting allocated slot times. 5) BOBCAT software includes tracking/ reporting capability will be used to identify users that habitually do not comply. ATFMU will contact these users to advise of non compliance and ascertain remediation proposed by users. 6) Bay of Bengal and South Asia ATFM Handbook includes comprehensive requirements and procedures for users of the system, including provision for non participating aircraft and coordination activities required in the event of a missed slot. 7) Two day BOBCAT Workshop (9 & 10 November 2005) for airline dispatchers and affected ATS officers will be conducted during ATFM/TF/4 meeting (7 – 11 November 2005).
	Hazard No 7
Description:	ATS Units do not comply with agreed wheels up and/or gateway fix times leading to congestion and un-flowed traffic sequence.
Remarks:	Inadvertent or willful non compliance by ATS Units with published wheels up and/or gateway fix times would lead to schedule conflicts at gateway fixes.

Mitigation:	1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management. 2) ICAO PANS ATM (Doc 4444) includes provisions at paragraph 7.8.1 which enable adjustments to be made to sequence of departing aircraft in respect of aircraft subject to ATFM requirements. 3) Implementation of flow management provided by BOBCAT is as a result of collaborative arrangements between Bay of Bengal ATS providers and IATA, including IATA member airlines. Industry consultation/liaison with/by IATA and ICAO Regional Office provides increased communications and agreement between users and ATS providers. 4) Downstream ATS Units will be required to tactically manage non compliances from upstream ATS Units. 5) AIP Supplement agreed by users and issued by involved States requires compliance by users with gateway slots allocated by BOBCAT. AIP Supplement will highlight importance of meeting allocated slot times. 6) BOBCAT software includes tracking/ reporting capability will be used to identify ATS Units that habitually do not comply. ATFMU will contact these ATS Units to advise of non compliance and ascertain remediation proposed by ATS Units. 7) Bay of Bengal and South Asia ATFM Handbook includes comprehensive requirements and procedures for users of the system, including provision for non participating aircraft and coordination activities required in the event of a missed slot. 8) Two day BOBCAT Workshop (9 & 10 November 2005) for airline dispatchers and affected ATS officers will be conducted during ATFM/TF/4 meeting (7 – 11 November 2005).

Sample AIC Text

IMPLEMENTATION OF AN AIR TRAFFIC FLOW MANAGEMENT (ATFM) OPERATIONAL TRIAL OVER THE BAY OF BENGAL AREA AND SOUTH ASIA

1 Implementation of ATFM Operational Trial Procedures

1.1 This AIC serves as notice that States in the Bay of Bengal, Indian sub-continent and Pakistan areas have jointly agreed to implement an air traffic flow management operational trial. This trial will be conducted under the auspices of ICAO and will be focused on traffic operating across the Bay of Bengal area towards northern India and the Kabul FIR.

1.2 The tentative date for implementation of the ATFM operational trial is 22 December 2005. Details of the trial, including States involved, airspace concerned and procedures to be followed by operators will be promulgated in due course by AIP Supplement in accordance with the AIRAC cycle procedures.

1.3 It is anticipated that all westbound flights crossing defined points in the specified FIRs, including those operating in the Kabul FIR between 1900UTC and 2400UTC, will be required to participate in the ATFM operational trial.

1.4 Accordingly, all civil flights operating in the area concerned during the period that Flow management procedures are in force will be required to comply with specific flight planning requirements. These requirements will be detailed and published in appropriate AIP Supplements.

1.5 The results of the trial will be subject to review by ICAO, States and operators concerned.

2 Objectives of the ATFM Operational Trial

2.1 The ATFM operational trial is focused on the following objectives:

(a) Reduced ground delays at departure airports.

(b) An informed choice of routing and flight level selection.

(c) A reduction in the requirement for re-routing over the Indian sub-continent

DRAFT AIP SUPPLEMENT

[AIRAC W. E. F _____ UTC]

OPERATIONAL TRIAL OF AIR TRAFFIC FLOW MANAGEMENT (ATFM) OVER BAY OF BENGAL

1 GENERAL

1.1 Introduction

Within the Bay of Bengal, Pakistan and South Asia airspace of ICAO ~~(~~Asia/Pacific~~)~~ Region, an integrated air traffic flow management (ATFM) service is being established to manage westbound air traffic transiting the Kabul FIR by satisfying ~~the~~ minimum spacing requirements at ~~the~~ established gate way points.

New words from ICAO docs re ATFM

Include names of all FIRs involved

Include all ATS Routes affected

Include Hours of operation

xxxxxxxxxxxxxxxxx

Contingency procedures – include later in the Supp

Missed slot procedures – include later in the Supp

xxxxxxxxxxxxxxxxxx

The service is ~~of~~ advisory in nature and provided by Bay of Bengal Co-operative Air Traffic Flow Management Advisory System (BOBCAT) of Aeronautical Radio of Thailand LTD ~~the~~ (AEROTHAI), which is supported by the AEROTHAI Air Traffic Flow Management Unit (ATFMU) in Bangkok and ATS Units in ~~Flow Management Positions (FMP) established in each area control centre of~~ participating FIRs.

The BOBCAT is responsible for all ATFM activities within its area of responsibility. Detailed information in respect of flow management operations has been included in the Bay of Bengal and South Asia ATFM Handbook, available at (web address – www.BOBCAT.aero ???). ~~(refer ATFM Handbook operations manual).~~

1.2 Information on air traffic flow management measures

Operational trials of Air Traffic Flow Management measures will commence from _____ and will serve aircraft intending to operate through Kabul FIR between 1900 and 2400 UTC.

BOBCAT ~~and Flight Management Positions at DELHI, KOLKOTA and CHENNAI~~ will function between 0800 and 2400 UTC ~~24 hours daily~~ and will cater to westbound flights operating through Kabul FIR between 1900 UTC and 2359 UTC each day.

Information on ATFM measures are distributed by the BOBCAT via:

a. The ATFM information message (AIM)

The AIM is produced, if required by the BOBCAT, to provide information and advice in relation to the application of current ATFM measures. An AIM is also used for initial publication of changes to strategic ATFM measures and BOBCAT ATFM operating procedures.

The AIMs are transmitted via AFTN and internet to ARO, ATC units and those aircraft operators who wish to be included in the address list.

1.3 Slot allocation procedures

Slot allocation is an ATFM measure established to reduce the demand to the level of the ATC capacity and to smooth out traffic flows, thus making full use of the available ATC capacity.

Slot allocation procedure is given below:

Dispatchers of aircraft departing from any airport and traversing primary routes used for transiting Kabul FIR via L 507, M770 and P646 are required to log on to BOBCAT and submit a set of choice of gate way point arrival and route segment flight levels in planning en-route and in transit through Kabul FIR before the cut-off time. After the cut-off time, BOBCAT will process requests for flights and notify the dispatcher by advising **the wheels-up time [WUT], ETO at key gateway points and cruising level through them** through web-site.

Time of entry	**Slot request**	**Slot allocation**
Kabul FIR	**cut-off time**	**Notification**
1900UTC-1959UTC	0900UTC	1000UTC
2000UTC-2059UTC	1000UTC	1100UTC
2100UTC-2159UTC	1100UTC	1200UTC

2200UTC-2259UTC	1200UTC	1300UTC
2300UTC-2359UTC	1300UTC	1400UTC

Dispatcher, who could not request for slot allocation, may request slot assignment in real time based on available slots after slot allocation is executed. BOBCAT will publish all available ETO on all flight levels of route segments connected to the gate way points leading to Kabul FIR with applicable Mach Number. After selecting the last gateway point, the available next gateway point and appropriate flight level route segment availability would be shown for the dispatcher to choose. This process has to repeat till reaching the point of entry or departure aerodrome.

Once airline dispatchers receive slot allocations, they will submit flight plans based on the slot allocations and the FPL will be transmitted to BOBCAT as well as other ATS units.

FMPS at DELHI, KOLKATTA and CHENNAI will log on to BOBCAT to view the summary result of the most recent slot allocation for their operations.

Airline operators are responsible for following the advice given by the BOBCAT.

2 AIR TRAFFIC FLOW MANAGEMENT PROCEDURES

2.1 Reference

ATFM procedures in Bay of Bengal, Pakistan and South Asia ~~BOB/South Asia~~, in addition to the general description above, are in conformance with the procedures set out in *DOC 4444 - Air Traffic Management,* and the Bay of Bengal and South Asia ATFM Handbook ~~operations manual..~~

2.2 Responsibility for ATFM measures

The BOBCAT, in close co-operation with affected ATS Units ~~the FMPs at Delhi, Kokotta, Bangkok, Singapore, Kualalamur, Dacca, Yangoon, Kathmandu ACCs,~~ is responsible for the execution of ATFM measures within the BOB.

2.3 Information on ATFM measures

Information with respect to ATFM measures can be obtained from the ARO responsible for the departure aerodrome.

2.4 Flight plans

a. Non-repetitive (ICAO) flight plans to or via flow restricted areas shall be submitted to the ARO at least ___ hours before EOBT.

b. Once a flight plan has been filed for a flight subject to ATFM measures, and an WUT has not been issued yet, any change in EOBT of more

than 15 minutes shall be submitted to the ARO, using a DLA message or by filing a new flight plan, after sending a CNL message. The new flight plan shall be transmitted not earlier than 5 minutes after the CNL.

2.5 Slot allocation

The departure slot is issued as a 'wheels –up time' (WUT).

The WUT is a nominal time with a tolerance of –__ to +__ minutes, which is primarily intended to enable ATC to allow for aerodrome congestion problems.

The WUT is issued not later than __ hours before EOBT.

The WUT is included in a Slot Allocation Message (SAM), which is sent by the BOBCAT to:

a. The address notified in advance to the BOBCAT by the aircraft operator, or
b. When the address is not known with the BOBCAT:
    1. The ARO of the aerodrome of departure and, if different,
    2. The flight plan originator.

Furthermore, TWR is informed about the WUT issued.

If no SAM is received until __ hours before EOBT, it can be assumed that the flight concerned may depart in accordance with the filed EOBT.

Aircraft operators shall arrange the departure of their flights to comply with the WUT issued.

2.6 Departure slot monitoring

ATC is responsible for departure slot monitoring at departure aerodromes. The exact procedures to be followed will depend on the way that ATS is organised at each aerodrome. There are, however, three requirements as follows:

a. ATFM slot, if applicable, be included as part of the ATC clearance. ATC shall take account of an applicable slot when clearance is issued.
b. ATC units responsible for departure slot monitoring shall be provided with the necessary information concerning the restrictions in force and slots allocated.
c. Aircraft operators shall inform themselves of and adhere to:
    - general ATFM procedures including flight plan filing, strategic ATFM measures and message exchange requirements; and

- current ATFM measures (e.g. specific measures applicable on the day in question).

2.7 ATFM incident reports

An ATFM incident is an significant occurrence affecting an ATS unit or an aircraft operator resulting from the application of or failure of ATFM measures or procedures.

An ATFM incident report may be originated by an ATS unit, an aircraft operator, an FMP or the BOBCAT.

Aircraft operators and ATC units wishing to file an ATFM incident report about an incident within INDIAN FIRs, are to contact the FMP at the DELHI ACC. The FMP will collect all essential information and data, analyse them and forward to the BOBCAT.

2.8 Special status flights

With the introduction of the BOBCAT it is possible for flight plan originators to obtain exemptions from the ATFM restrictions for certain flights through the use of STS/ indicators in FPL.

The **STS indicator in field 18** of a flight plan will identify that a flight may require special handling. This indicator is for use by all parties which may have to handle the flight.

2.8.1 Flights exempted from ATFM measures:

In accordance with PANS ATM (Doc 4444, Section 3-2), certain flights may be exempt from ATFM measures, or be given priority over other flights. Exempted flights may include VVIP, SAR, humanitarian and medical flights.

~~The following flights are exempted from ATFM slot allocation and shall include, in Item 18 of the flight plan form, the appropriate STS indicator:~~

~~a. Flights in a state of emergency, including flights subject to unlawful interference; **STS/EMER**.~~

~~b. Flights conducting search and rescue operations; **STS/SAR**.~~

~~c. Flights carrying Head of State or equivalent status; **STS/HEAD**.~~

~~d. Flights medical, specifically declared by the medical authorities; **STS/ATFMEXEMPTAPPROVED**.~~

~~e. Flights for humanitarian reasons; **STS/ATFMEXEMPTAPPROVED**.~~

~~f. Flights carrying person or persons on board on State business of such importance that the flight cannot accept any delay; **STS/ATFMEXEMPTAPPROVED**.~~

~~[Note: STS/ indicator, STS/ATFMEXEMPTAPPROVED, is introduced which may only be used if that particular flight has received specific approval from the Office established by the State for processing such requests; WSO, DELHI is the nodal officer for approving such requests.]~~

~~The decision to use a particular status indicator is the responsibility of the aircraft operator. **Unauthorised use of any of these indicators with the intention of avoiding flow regulations is considered as a serious breach of procedure and shall be dealt with accordingly.**~~

~~The BOBCAT has been authorised, through its international co-ordination machinery, to change in the way in which specific flights are to be treated by the BOBCAT systems in respect of ATFM exemptions.~~

~~Further information on the use of STS/ indicators for ATFM purposes can be found in the ATFM Handbook Operations Manual.~~

2.8.2 Guidelines for determining the need for the use of STS/ATFMEXEMPTAPPROVED for an individual flight

a. Is the safety of human life involved? This means that if the flight does not operate without delay a human life or lives may be lost. Such flights shall require specific medical/UNHCR authorisation in support of their request;

b. Is the person or are the persons on board a flight on State business of such importance that the flight cannot accept any delay?

c. Is the mission of the flight being carried out by, or on behalf of, the State and is of such importance that any delay will jeopardise the success of the mission?

If the answer to any of the above questions is yes, then the flight may apply for approval to use STS/ATFMEXEMPTAPPROVED through the procedure specified in paragraph 2.8.3.

2.8.3Procedure for requesting authorisation for the use of STS/ATFMEXEMPTAPPROVED

The operator of a flight seeking approval to insert the indicator STS/ATFMEXEMPTAPPROVED in Field 18 of a flight plan for a flight departing from an aerodrome within Indian FIRs shall obtain prior permission from ARO-of the departure aerodrome in the course of FPL submission. The ARO in turn will coordinate with WSO, DELHI prior to accepting the` STS/ATFMEXEMPTAPPROVED'.

2.9Rule of application for the use of STS/ATFMEXEMPT APPROVED

It should be noted by all users that any flight which obtains exemption and which may have otherwise been delayed, will have that delay passed on to other flights. It is essential, therefore, that use of the exemption facility shall be

properly controlled and policed so that genuine priorities may continue to operate without ATFM delay. To this end, this Rule of Application is implemented and applies to all flights operating within the BOB area of responsibility

3. Addresses

BOBCAT (Central Flow Management Unit)	Postal address: (general) Telephone: Fax:	
FMP DELHI ARO, DELHI	Postal address: (general) Telephone: Fax:	
FMP KOLKOTTA ARO, KOKOTTA	Postal address: (general) Telephone: Fax:	
FMP CHENNAI ARO, CHENNAI	Postal address: (general) Telephone: Fax:	

4 CONTINGENCY PROCEDURES

4.1 MODIFICATION OF ESTIMATED OFF BLOCK TIME (EOBT)

4.1.1 Introduction

It is a prime requirement or both ATC and ATFM, that the EOBT of a flight shall be an accurate EOBT. This applies to all flights, whether subject to ATFM or not.

These procedures are to enable an Airline Operator (AO) to meet this requirement whenever they know that the EOBT of a flight will require modification.

The ICAO requirement is that delays in excess of thirty (30) minutes should be communicated. This requirement is mandatory. The rules concerning modification to an EOBT for flights, which are departing, arriving or over-flying BOB will change: the requirement in BOB is that any change (+ or -) in an EOBT of more than ___ minutes shall be communicated.

There are two categories of flights concerned: those, which have an ATFM slot, issued by the BOBCAT, and those who have not

4.1.2 Procedure for modifying the EOBT of a flight not having received an ATFM SLOT from the BOBCAT

Procedure:

To amend the EOBT to a later time, a DLA (or CHG) message shall be sent to ARO for onward transmission to BOBCAT.

To amend the EOBT to an earlier time, a CNL message shall be sent to ARO followed ____ minutes later by a new flight plan with the new EOBT indicated.

ARO in turn will transmit the FPL to BOBCAT.

4.1.3 Procedure for modifying the EOBT of a flight, which has received an ATFM SLOT from the BOBCAT

AO should note that an EOBT should not be modified simply in response to any possible delay due to an ATFM slot. If the EOBT established by the AO can no longer be met for reasons other than ATFM, then:

If the EOBT of a flight has changed or is no longer realistic then the following procedure shall be used:

a. If a flight has an ATFM slot (WUT) which cannot be met, then the AO shall send a DLA (or CHG) message to ARO with the new EOBT of the flight. This may trigger a revised WUT.

b. If a flight has an ATFM slot (WUT) with some delay and the AO is aware that the original EOBT cannot be met but the existing WUT is acceptable then a DLA (or CHG) message shall be sent to ARO with the new EOBT of the flight. However, in order not to trigger a new WUT with a worse delay, the following formula may be used:

   - Take the current WUT, minus the taxi time, minus 10 minutes and send the new EOBT.

In both cases (a) and (b), ARO will transmit the message to BOBCAT as well as FMPs without delay.

However, as BOBCAT systems are continuously seeking to give zero delay, the WUT of the flight will never be earlier than the new EOBT plus the taxi time.

It is not possible to amend the EOBT to an earlier time than the EOBT given in the flight plan however, if a flight is ready to go off blocks earlier than the current EOBT, then there are two options available:

c. The AO may ask the local ATC Unit (TWR) or the FMP to send a Ready (REA) message. In this case, the flight is considered as “ready to depart” from the filing time of the REA message.

d. The AO may contact BOBCAT Help Desk who have the possibility to input an earlier EOBT into the TACT system (max –30 minutes). Each case is treated on its merits and may be refused if it is considered that "abuse" is involved.

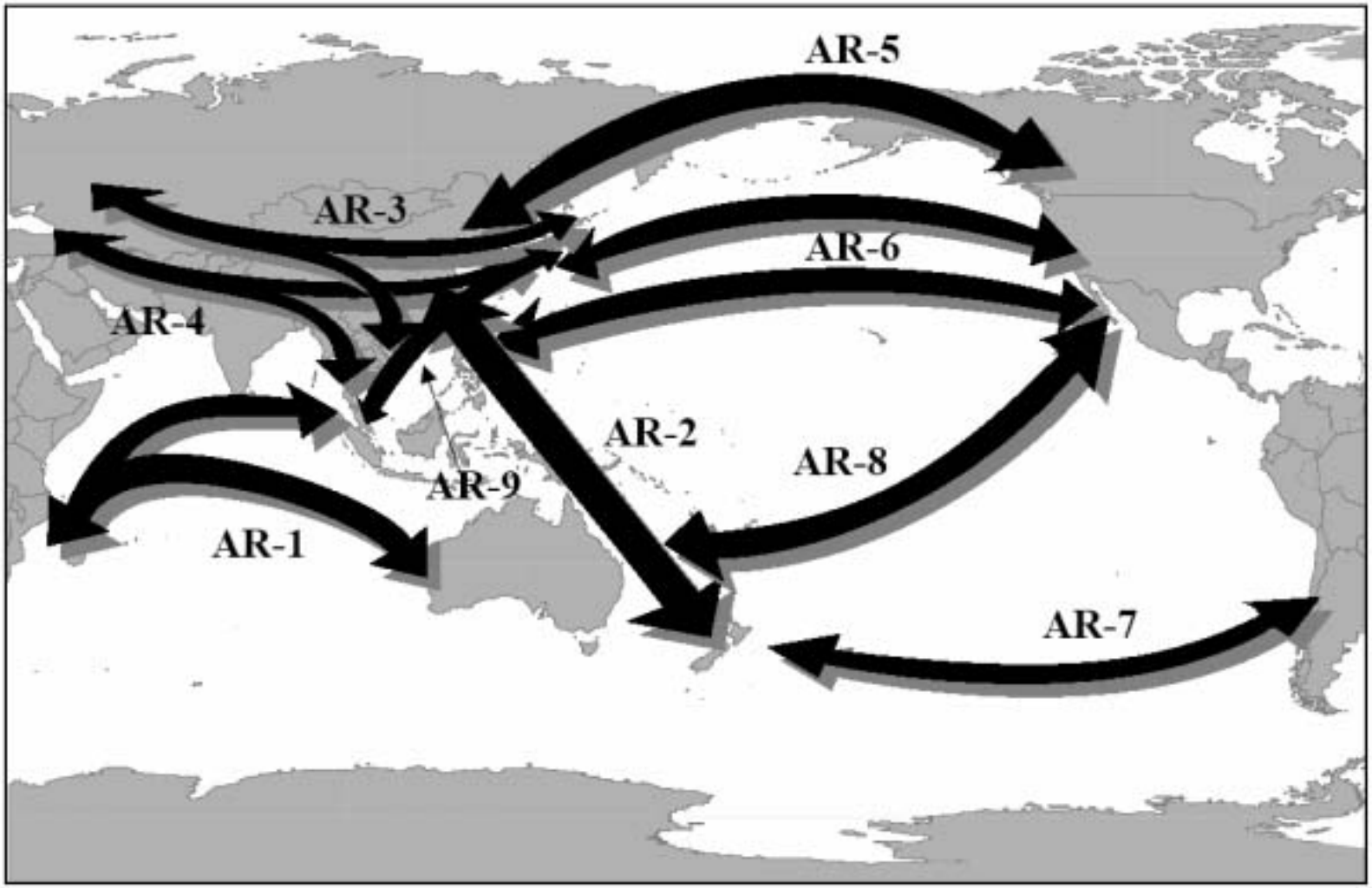
TASK LIST FOR THE IMPLEMENTATION OF AN ATFM ADVISORY SYSTEM TRIAL IN THE BAY OF BENGAL (VERSION 2.0)

ID	Task Name	Start Date	Finish Date	Completion Date	Action By	Resource Names/Remarks
1.0	**Operational Issues**					
1.1	Identify Operational Needs		9 Sep 2005			
1.2	Co-ordinate and update Operational Concept		9 Sep 2005			
1.3	Define ATFM airspace/States involved		9 Sep 2005			
1.4	Define data collection plan	01 May 2005				Regional data captured Apr 05; India provided additional data 9 – 15 May 2005
1.5	Examine the operational factors and workload associated with implementation	22 Apr 2005				
1.6	Determine required ATFM tools		1 July 2005			AEROTHAI BOBCAT system to commence ATFM system trial by 31 December 2005
1.7	Develop, coordinate and submit necessary international and regional documentation					Refer to ATM/AIS/SAR/SG for guidance/advice on multi-lateral agreements required.
2.0	**Develop ATFM Operations Manual and Procedures**	1 Jul 2005	9 Sep 2005			
2.1	Develop ATFMU procedures					
2.2	Develop ATS Unit(s) procedures					
2.3	Develop Airline procedures					
2.4	Develop contingency procedures					(e.g ATFM system/comm. outage)
3.0	**Establishment of an ATFMU**					
3.1	Determine operating hours, manning and equipment requirements		9 Sep 2005			
3.2	Coordination and communications requirements with ATS Unit(s) and Airlines	1 July 2005				
3.3	Assess workload and procedures for ATFMU and Airlines					

ID	Task Name	Start Date	Finish Date	Completion Date	Action By	Resource Names/Remarks
4.0	**Financial considerations**					
4.1	Determine funding arrangements for operation of ATFM service					Not required for trial – will be discussed prior to acceptance of ATFM system
5.0	**Determination of Communication and Interface links**					
5.1	Establishment of communication/interface links between ATFMU and ATS Unit(s)	1 Jul 2005	15 Dec 2005			Further discussions at ATFM/TF/3
5.2	Establishment of communication/interface links between ATFMU and Airlines	1 Jul 2005	15 Dec 2005			Further discussions at ATFM/TF/3
6.0	**Complete coordination with adjoining States and Industry organisations**					
6.1	Publish AIC on the ATFM trial	1 Jul 2005	4 Aug			
6.2	Publish necessary AIP Supplement					
6.3	Publish Trigger NOTAM		24 Dec 2005			7 days prior to implementation
7.0	**SMS requirements as per Annex 11**					Satisfy requirements of ATFM against Annex 11 SMS
8.0	**Training**					
8.1	Conduct training for Air Traffic Controllers and Airline Dispatchers					
8.2	Information dissemination to Airlines					
9.0	**Perform system verification**					
9.1	Conduct verification of ATFM system tool					
9.2	Conduct and review paper exercise					

ID	Task Name	Start Date	Finish Date	Completion Date	Action By	Resource Names/Remarks
10.0	**Decision for the commencement of operational trial**					
10.1	Review all factors affecting implementation decision					
10.2	Declare full operational trial capability					
11.0	**Decision to proceed to full implementation of ATFM Phase One for Bay of Bengal using BOBCAT system**					
12.0	**Post implementation review of operational trial**					
12.1	Carry out post implementation review					
13.0	**Monitor System Performance**					
13.1	Perform follow-on monitoring					

Figure 10.1 - Major Traffic Flows



Extracted from the Asia/Pacific Basic Air Navigation Plan (2001)

PART V.II - AIR TRAFFIC FLOW MANAGEMENT (ATFM)

2.4 The objective of ATFM is to ensure an optimum flow of air traffic to or through areas during times when demand exceeds or is expected to exceed the available capacity of the ATC system. The ATFM system in the ASIA/PAC Regions should therefore reduce delays to aircraft both in flight and on the ground and prevent system overload. The ATFM system assists ATC in meeting its objectives and achieving the most efficient utilization of available airspace and airport capacity. The ATFM should also ensure that safety is not compromised by the development of unacceptable levels of traffic congestion and, at the same time, to ensure that traffic is managed efficiently without unnecessary flow restrictions being applied.

1. General principles of the ATFM Service

1.1 In airspaces with high volume of air traffic, ATFM is needed to support ATS as a planning tool by providing for an optimum flow of air traffic to or through areas during times when demand exceeds or is expected to exceed, the available capacity of the ATM system. The oceanic ATFM service should be interfaced with domestic ATFM organizations/units to provide maximum harmonization.

1.2 When operationally required, the APANPIRG should develop appropriate procedures for the provision of the ATFM service within the ASIA/PAC Regions to cater for the requirements of flights to and from FIRs in the region and adjacent to it. To achieve this, the following basic principles should be covered in the future ATFM system:

a) Pro-active ATFM requires the ability to dynamically interact with the strategic planning of traffic flows. Therefore, ATFM in the ASIA/PAC Regions should be interfaced with the overall ATFM strategies in other regions. To this end the ATM system should also be capable of adjusting to the varying requirements;

b) Re-active ATFM is required to take account of short-term contingencies. The ATM system should be able to react quickly and provide early information and advice to the controller and the pilot of the best tactical response necessary to achieve ATFM objectives;

c) Data should be collated on likely demand using historical information, planned development by airports and airlines, aircraft manufacturers, plus the economic forecast and trends in States of the regions;

d) A recognized and common methodology for the assessment of the capacity of the current and planned ATM system should be developed to include sector capacities and in particular “choke” points;

e) Regions should consider the introduction of a centralized flow management unit; and

f) Where more than one flow management units exist, plans to harmonize procedures and practices with adjacent units should be developed.