THE BAY OF BENGAL COOPERATIVE AIR TRAFFIC FLOW MANAGEMENT SYSTEM (BOBCAT)

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ABSTRACT
The purpose of this paper is to explain the Bay of Bengal Cooperative Air Traffic Flow Management System (BOBCAT) developed and operated by AEROTHAI under the auspices of ICAO as a part of the operational implementation of ATFM for westbound aircraft transiting Afghanistan airspace (Kabul FIR) during the busy nighttime period enroute to destinations within Europe. This is the first of a three-phased strategy to assist air traffic service providers and the international aviation community through this critical area.

KEYWORDS
Air Traffic Control, ATC, Air Traffic Flow Management System.

INTRODUCTION

History
The Bay of Bengal is a large expanse of water and this area is used by many medium and large international long-haul aircraft from a number of airlines that daily operate from Southeast Asia to European and Middle East destinations. Those operating to/from Europe prefer to flight plan over Afghanistan (Kabul FIR) as it is close to the great circle routing to/from European cities. In late 2001, as a result of military conflict within and around Afghanistan, these aircraft suffered severe restrictions to their operations. These restrictions are continuing with only four ATS routes and three usable levels being available for these transiting aircraft.

A further limitation comes from the fact that conventional vertical separation minima (CVSM) is still being applied with transitions requirements carried out by Pakistan (RVSM to CVSM) to the South and by Turkmenistan and Uzbekistan (CVSM metric to CVSM) to the North.
A revised ATS route structure, Asia to the Middle East and Europe South of the Himalayas (EMARSSH) was introduced in November 2002, increasing parallel routes between Southeast Asia, Europe and the Middle East, utilizing the benefits of 50NM lateral spacing (RNP10) between most routes over the Bay of Bengal and the Arabian Sea.

In November 2003, Reduced Vertical Separation Minimum (RVSM) was also implemented along these airways, which, together with the new route structure, provided the opportunity to accommodate a further increase in air traffic through this area.

Due to the ongoing military situation in Afghanistan, the full benefits of EMARSSH and RVSM have not been realized for long-haul carriers to Europe. In fact, these initiatives may have even contributed to bottlenecks entering the Kabul FIR.

![Figure 1. Air routes in the Bay of Bengal area.](image)

ICAO formed an ATFM Task Force for the Bay of Bengal and South Asia region in April 2005 with the objective to enhance traffic flow across the Bay of Bengal and South Asia, while minimizing ground and en-route delays, maximize traffic capacity, optimize traffic flow in the area, plan and manage future ATS workload as well as assessing...
economic and environmental impact of the ATFM system.

To meet the objectives the Task Force adopted a phased implementation program as follows:
- Phase one: Flights planning to transit the Kabul FIR
- Phase two: Other international flights crossing the Bay of Bengal and/or South and South East Asia areas
- Phase three: Future planning for increased traffic within the Bay of Bengal and South and South East Asia areas (For the purposes of the ATFM/TF, South Asia includes, India, Nepal, Pakistan and Sri Lanka)

**Figure 2.** Air routes in the Afghanistan FIR.

**BOBCAT System**

The BOBCAT system is a secured web-based strategic ATFM system. It has been designed to alleviate problems in the Kabul FIR by taking into account constraints of key Kabul entry waypoints and route segments that aircrafts transit while in en-route to the Kabul FIR. In perspective, these waypoints and route segments are resources that need to be rationed in time to satisfy minimum separation requirements. The system has the flexibility of metering slot times depending on the traffic flow and the requirements on the air navigation service providers (ANSPs) concerned. The current configuration of the system caters for westbound aircraft entering the Kabul
FIR during the busy nighttime period between 2000-2359UTC.

**Players in the BOBCAT System**

Players in the BOBCAT System are:
- Airline Dispatchers
- Air Navigation Service Providers;
and,
- Bangkok Air Traffic Flow Management Unit (Bangkok ATFMU)

**Airline Dispatchers**

Several hours prior to the agreed cutoff time of 1200UTC, airline dispatchers securely log-on to the BOBCAT website using their assigned username/password and submit slot requests for waypoint, time and flight level for entry into the Kabul FIR. Due to the distance from departure point to Kabul FIR entry gate, submission of this information is required several hours ahead of gate time into Kabul FIR to cater to departures furthest away of up to 7 hours flight time. In addition, dispatchers are asked to notify maximum acceptable delay for each choice nominated.

Once the cutoff time for slot request is reached, no more submission will be accepted. BOBCAT then processes the requests received from airlines into the night’s allocation. As a measure of precaution, the Bangkok ATFMU checks the slot allocation result. Once confirmed, the slot allocation displayed on the webpage as well as e-mailed to airlines.

In the event that an aircraft has not been assigned a slot time from their initial requests or the slot allocation was not satisfactory, airline dispatchers have the ability to select an unused slot displayed at the BOBCAT website.

Another feature of BABCAT facilitates the storage of submitted requests as a slot request template so that airline dispatchers have the ability to call up a particular slot request template or slot request from the past, edit and use for flights on that night or in the future.
Air Navigation Service Providers (ANSPs)

ANSPs have a significant role to play in the BOBCAT system. To ensure they have a situational awareness of the night’s traffic, ANSPs also log-on to BOBCAT using their own dedicated username/password to view slot allocation results. The slot allocation result would show the wheels-up time for each aircraft from all departure points as well as ETA’s for significant en-route reporting points of all aircraft.

The slot allocation pages update periodically to show and highlight the latest information. The screen can be configured to cater for different needs with ACCs as well as control towers. As an example, an ACC may choose to have their display in aircraft “wheels-up” order and an en-route ACC, especially Karachi FIR, Lahore FIR and Kabul FIR, in a sequence along an ATS route where aircraft enter their airspace. ANSPs cannot input to the system but can manage their display to achieve their needs.

Bangkok Air Traffic Flow Management Unit (Bangkok ATFMU)

Management of the BOBCAT system rests with the Bangkok ATFMU located in the Bangkok ACC, Thailand, on behalf of all users involved with ATFM project. The ATFMU is manned continuously to cater for the evening westbound rush hour period each night.

The ATFMU Manager responsible for the management of BOBCAT stationed at the Bangkok
ATFMU has a wide range of viewing choices. This position has the capability to modify slot allocation as required. The ATFMU has communications to liaise with all ACC’s and dispatchers involved in the ATFM process. This would be especially significant during periods of significant adverse weather or other contingency conditions.

All participants in the BOBCAT system are able to communicate with the ATFMU via phone, fax, email or AFTN. All aircraft flight plan information submitted by aircraft participating in BOBCAT is relayed to ATFMU through their dedicated AFTN address.

In summary, any westbound aircraft planning to enter the Kabul FIR between 2000 to 2359UTC is required to submit a slot request to the Bangkok ATFMU for processing. They are also required to conduct their flight in accordance with State AIPs and the ATFM Users Handbook.

Cooperation between ANSPs and Airlines

It should be understood that BOBCAT is a cooperative strategic ATFM tool managed by AEROTHAI on behalf of ANSPs and airlines involved. This does not take away responsibility from ANSPs to control aircraft from departure to entry into Kabul FIR.

Taking this principle into account, success depended on the accuracy of the information provided by dispatchers as well as the cooperative effort of ATC to meet the final results of the BOBCAT sequence of events.

Airline Considerations

As the BOBCAT system allocates time-based slot of entry into the Kabul FIR to aircraft, it is essential that aircraft depart in accordance to the prescribed Allocated Wheels-Up Time (AWUT) from the departure airports. Efforts from within the airlines in ensuring that their aircraft were ready for departure by the AWUT plus a buffer of 5 minutes was paramount in enduring that aircraft can enter the Kabul FIR in accordance with the slot allocation plus 5 minutes.

Moreover, airline participation were also essential in ensuring that long-haul aircraft departing from ports like Singapore, Kuala Lumpur or Bangkok with some delays and expectation to transit the Kabul FIR at its preferred flight level would be able to achieve the slot allocation. Participation of IATA throughout the process has been immensely helpful in ensuring airline participation in the system.

NSP’s Role in BOBCAT

There are approximately eight ANSPs involved in ATFM over the Bay of Bengal to the Kabul FIR boundary that have a significant role to play to ensure a smooth flow of aircraft at the required separation minima both vertical and horizontal through Afghanistan airspace.
ANSPs are required to manage the traffic using all their tools necessary to ensure all aircraft planning via the Kabul FIR have access to their designated slot allocation, which includes flight level and ATS route. For departure ANSPs, their role is to ensure that aircraft depart in the AWUT window. It is a requirement for all operating during the ATFM to obtain and adhere to slot allocation. Otherwise, the aircraft would be managed in ways that would not affect aircraft with slot allocation. The management of non-compliant aircraft is a responsibility ANSPs involved. For the aircraft who do not adhere to the ATFM procedures, ANSPs may use delayed pushback and start clearances, non-preferred routes and/or flight levels, en-route holding and/or diversion around the Kabul FIR.

**Changes to Slot Allocation Due to Operational Difficulties**

Changes to slot allocation due to operational difficulties will be coordinated with the Bangkok ATFMU through either airline dispatchers or ANSPs involved.

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**RESULT AND DISCUSSION**

Many unique factors have been taken into consideration in the design of BOBCAT. Consequently it is somewhat difficult to align this ATFM system with any known flow management tool that is presently being used in other parts of the world. Some examples are given below:

- The BOBCAT system looks at spacing aircraft in a safe and orderly manner through the Kabul FIR that is between one hour to seven hours from the aircraft departure point;
- Aircraft are departing from airports from many locations in various countries and are traveling through airspace with a variety of separation criteria;
- Aircraft have the opportunity of using many RVSM levels en-route but are required to operate at a maximum of three CVSM levels through the Kabul FIR. As a consequence, procedures within BOBCAT need to be designed to take this into consideration; and,
- Eleven FIRs with seven States involved are within the prescribed ATFM area.

ATFM operational trial using the BOBCAT system commenced on 24 July 2006 to evaluate suitability of the system to traffic situation presented. The ATFM operational trials featured participation of over 30 airlines.

The BOBCAT system, along with the Bangkok ATFMU operated continually without major issues, while overseeing vast traffic increase.
from an average of 38 aircraft during the BOBCAT period in July 2006 to an average of 53 aircraft in April 2007 (39% increase), with a peak night of 61 aircraft. In May 2007, ATFM procedures using the BOBCAT system were operationally implemented on AIRAC date 5 July 2007, marking the implementation of the world’s first international long range AFTM procedures.

**Other Airlines Involved**
- Vietnam Airlines
- Cathay Pacific
- SAS
- Swiss International
- Uzbekistan Airways
- China Airlines
- Air Canada
- Delta Airlines
- Aeroflot
- Royal Brunei Airlines
- EVA Air
- Blue Panorama
- LOT Polish
- Cargolux
- Transaero Airlines
- Continental Airlines
- Turkmenistan Airlines
- Aerosvit
- General Aviation

**Benefits**
Once implemented, the AFTM system is expected to provide the following benefits:
- ATFM is a mechanism to streamline aircraft departures. ATFM aircraft now depart on their allocated wheels-up time in an orderly fashion. This lessens ground delays for participating aircraft. Aircraft, who choose not to submit a slot request but still wish to go over Afghanistan, are delayed so that they do not interfere with aircraft that participate in the ATFM system.
- The orderly departures translate into orderly entry into Afghanistan. Statistics shows there is far less reroutes as well as more evenly utilized ATS routes.
- The four available ATS routes in the Kabul FIR are more evenly used by airlines.
- Based on information supplied from IATA, as well as some major airlines, the overall fuel savings for all airlines using ATFM BOBCAT during this four-hour period of operation is approximately 12 million kilograms of fuel per year.
- By analogy, the fuel savings equates to a reduction in carbon emissions of approximately 50 million kilograms per year.
- Further, when calculated in terms of overall airline costs savings along with minimized reroutes, this amount to USD 12 million throughout the aircraft participating in the ATFM BOBCAT system.

**CONCLUSION AND RECOMMENDATION**

BOBCAT and the Bangkok ATFMU are the strategic engines that drive ATFM implementation in the region. ICAO leadership was essential during the 2 ½ years of development through 10 ATFM Task
Force meetings to final implementation. IATA acted as a leader of airlines in providing requirements, feedback as well as encouraging airline collaboration to ensure final ATFM implementation. The ‘C’ in the BOBCAT system stands for ‘Cooperation’, which was needed and given by all players involved in contributing to the success of this ATFM project.

It is worthy to note that there are further important areas such as the South China Sea where the number of aircraft operating through this area has risen to the point where ATFM procedures need to be investigated. AEROTHAI may be in a position to offer a similar automated ATFM model to cater for this area as well as other areas of similar needs.

BIBLIOGRAPHY


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