**INTERNATIONAL CIVIL AVIATION ORGANIZATION**

# REPORT OF THE FIFTH TASK FORCE MEETING ON A REVISED ATS ROUTE STRUCTURE – ASIA TO MIDDLE EAST/EUROPE, SOUTH-OF-THE-HIMALAYAS (EMARSSH TF/5)

DELHI, INDIA, 26 TO 30 NOVEMBER 2001

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

Adopted by the Task Force
and published by the ICAO Asia and Pacific Office

# TABLE OF CONTENTS

## PART I - HISTORY OF THE MEETING



## PART II - REPORT ON AGENDA ITEMS



## APPENDICES

## PART I – HISTORY OF THE MEETING

### 1. Introduction

1.1 The Fifth Task Force Meeting on a Revised ATS Route Structure – Asia to Middle East/Europe, South-of-the-Himalayas (EMARSSH TF/5) was held in Delhi, India, from 26 to 30 November 2001.

### 2. Attendance

2.1 The meeting was attended by 31 participants from 10 States and 2 International Organizations. A list of participants is at Appendix A to this report.

### 3. Opening of the Meeting

3.1 Mr. K Ramalingam, Member (Operations and Planning), Airports Authority of India, officially opened the meeting and welcomed all delegates to Delhi. He emphasised that four EMARSSH meetings had already taken place across the whole area of the project and it was now time to finalise the work in the Asia Region as well as look at the interface requirements with the Middle East region. Mr Ramalingam wished the meeting success in its endeavours to complete the work prior to implementation at the end of 2002.

### 4. Officers and Secretariat

4.1 Mr. John E. Richardson, Regional Officer, Air Traffic Management, ICAO Bangkok Office and Chairman of the Task Force, introduced the members of the Core Team, who will lead the EMARSSH project through to implementation. They were Mr. Mohamed Khonji, Deputy Regional Director, ICAO Middle East Office; Mr. Ron Rigney, Airservices Australia; Mr. P.C. Goel, Airports Authority of India; Mr. Mervyn Fernando, Civil Aviation Authority of Singapore; Mr. Davood Khodaverdi, Civil Aviation Organization of the Islamic Republic of Iran; and Mr. David Behrens, IATA Asia/Pacific.

### 5. Documentation and Working Language

5.1 All discussions were conducted in English. Documentation was issued in English. A total of 12 Working Papers, 6 Information Papers, 1 Discussion Paper and 1 Flimsy were considered by the meeting. A list of Papers is at Appendix B.

## PART II - REPORT ON AGENDA ITEMS

### Agenda Item 1: Adoption of the Agenda

1.1 The meeting reviewed the provisional agenda presented by the Secretariat and adopted it as the agenda for the meeting. The Agenda is at Appendix C.

### Agenda Item 2: Issues related to the EMARSSH ATS route structure network

2.1 The meeting noted that at the 11th Meeting of APANPIRG in September 2000, two important conclusions were developed with regard to the EMARSSH project. They were *Conclusion 11/10, Development of a Revised ATS route structure - Asia to/from Europe/Middle East, South of the Himalayas* and *11/11, Planning and Implementation Strategy*. A further conclusion of that meeting was also developed (Conclusion 11/12) which dealt with the Principles to be used in the development of the route network.

2.2 These conclusions were noted by all previous EMARSSH meetings. No disagreement or adverse comment was received and furthermore, they were also endorsed by the Air Navigation Commission and the ICAO Council.

2.3 The meeting reviewed the work already accomplished by previous Task Force meetings and noted that a sound framework had been prepared in preparation for implementation, scheduled to take place on 28 November 2002. However, much additional work was still required before the final transition to the new route structure could be attained. Many areas which had been identified at previous meetings now needed urgent attention to achieve success. These included:

a) AIS matters such as AIC, AIP Supplements and Amendment to the Air Navigation Plan;

b) Contingency Procedures including Weather Deviation Procedures, Navigational errors and Environmental factors (e.g. volcanic activity);

c) Training considerations;

d) Civil/Military co-ordination and agreements;

e) Airspace safety assessment and on-going monitoring arrangements for navigational errors;

f) Develop transition procedures from old to new routes during the implementation phase.

g) Exclusive/non exclusive RNP airspace; and,

h) Fine-tune the EMARSSH route structure developed through Task Force one to four.

2.4 It was agreed that the task was achievable but required urgent attention and the full co-operation and commitment of all three ICAO Regional Offices as well as States concerned.

2.5 **EMARSSH Phase One implementation (Australia/Indonesia/Singapore/Malaysia)**

2.5.1 Australia presented a report to the meeting on plans to implement EMARSSH routes between Australia, Indonesia, Singapore and Malaysia on 29 November 2001. This early implementation is referred to as EMARSSH Phase One.

2.5.2 The meeting was informed that plans for EMARSSH Phase One had been proposed and developed at previous EMARSSH TF meetings, and finalised during recent bi-lateral ATS Co-ordination Group meetings between Australia and Indonesia. Transition to implementation of Phase one will commence on 29 November, 2001.

2.5.3 Australia informed the meeting that RNP10 was an essential element in support of EMARSSH routes between Australia and Indonesia. They advised that RNP10 had been established in the Northern Australian Oceanic airspace on 4 October 2001, and that Indonesia would implement RNP10 concurrently with the implementation of EMARSSH Phase One routes.

2.5.4 Australia also provided information on the processes required for the allocation of ATS Route designators and way-points for use on the new routes. Whilst the emphasis was on an "end-to-end process", individual States retained responsibility for certain tasks, including training, facilities, safety assessments and NAV monitoring programs. States were also responsible for formal notification to ICAO for amendments to the Air Navigation Plan (ANP).

2.5.5 Australia concluded by acknowledging the excellent level of co-operation and liaison between the States and industry representatives, in the development and implementation of EMARSSH Phase One. The meeting was provided with two examples of where close Civil/Military co-operation within Indonesia had facilitated approval to align two new EMARSSH routes in close proximity to existing Military areas.

## Agenda Item 3: Review action plan for the implementation of the EMARSSH route structure network

3.1 **Establishment of Airspace Safety Requirements for Implementation of EMARSSH**

*Safety Management Requirements*

3.1.1 The meeting was advised that Amendment 40 to Annex 11 applicable on 1 November 2001 includes provisions on ATS safety management. In Section 2.26 States are required to implement systematic and appropriate safety management programmes to ensure that their ATS systems achieve an appropriate level of safety, and that any changes to the system will not jeopardise the safe operation of the system.

3.1.2 A safety management programme for an ATS system must perform two major functions which, while they may share many common techniques, have different aims. These functions are:

a) safety assessment of proposed additions and changes to the system; and

b) monitoring and evaluation of the level of safety being achieved in the operational system.

3.1.3 The EMARSSH project will introduce lateral separation minimum of 93 km (50 NM) between tracks on 28 November 2002. The meeting noted that the derivation of the separation minima was based on a collision risk model and target level of safety (TLS) method. In order to implement and operate the above separation standards, a safety assessment must be carried out to verify that the TLS can be met prior to implementation. Also, system performance monitoring arrangements must be established for ongoing operations to ensure that aircraft navigation continues to meet the TLS, and periodically a safety analysis will need to be carried out.

*Establishment of a target level of safety for the Asia/Pacific region*

3.1.4 The APANPIRG/12 meeting (August 2001) noted that Annex 11, Attachment B, recommends that a TLS of $5 \times 10^{-9}$ fatal accidents per flight hour per dimension (horizontal and vertical) be established where appropriate by regional agreement, for route systems implemented after the year 2000. The meeting agreed that this TLS should be adopted for route systems in the Asia/Pacific Region and formulated the following conclusion:

***Conclusion 12/41 – Establishment of a Target Level of Safety for the Asia/Pacific Region***

*That, a target level of safety of $5 \times 10^{-9}$ fatal accidents per flight hour per dimension be established for en-route systems in the Asia/Pacific Region where a TLS is required for implementation of separation minima.*

3.1.5 In light of the above, the meeting agreed that the EMARSSH project should adopt the TLS of $5 \times 10^{-9}$ fatal accidents per flight hour per for the route system within the Asia Pacific Region. The MID region had there own TLS adopted by MIDANPIRG.

*Establishment of a Regional Monitoring Agency*

3.1.6 In order to implement and operate the EMARSSH route system, the meeting noted that States responsible for providing the air traffic services are required to monitor the airspace system performance and participate in the regional monitoring arrangements established for the route system. A Task Force has been established by APANPIRG/12 under the following Decision:

***Decision 12/44 – Establishment of a Task Force to Develop an Airspace Safety System Performance Monitoring Structure for the Asia/Pacific Region***

*That, a Task Force be established reporting to APANPIRG to develop an airspace safety system performance monitoring structure and funding mechanism for the Asia/Pacific Region in accordance with ICAO provisions. The composition, guiding principles and Terms of Reference of the Task Force are as shown in the Appendix B to the Report on Agenda Item 3.*

3.1.7 In view of the foregoing developments, the airspace system monitoring requirements that apply to the EMARSSH project within the Asia Pacific Region would be taken into account by the Task Force called the Asia Pacific Airspace Monitoring Task Force (APASM/TF). The first meeting of APASM/TF will be held in Bangkok from 12 to 14 December 2001. The APASM/TF is expected to complete its task and report to the APANPIRG/13 meeting in September 2002. The MID region has their own Middle East Central Monitoring Agency

*Letters of Agreement on the monitoring of aircraft navigational errors*

3.1.8 In considering the preparations necessary for the implementation of EMARSSH routes on 28 November 2002, the meeting noted that there would be a need to revise existing Letters of Agreements (LOA) to reflect the revised ATS route structure and RNAV/RNP 10 operations. It also recognised that there was a need to establish procedures for the monitoring of navigation errors to support RNP 10 operations. In this regard, LOAs for the Monitoring of Aircraft Navigation Errors within the airspace concerned would also be required between implementing States.

3.1.9 The meeting was informed that States in the South China Sea region had recently signed similar agreements prior to the implementation of a revised parallel route structure on 1 November 2001. These States had signed a multi-lateral LOA on Monitoring of Aircraft Navigation Errors, which could be used as a basis for States participating in the EMARSSH project. However, in view of the extent of the area affected by EMARSSH routes, it was felt that multi-lateral LOAs on Monitoring of Aircraft Navigation Errors could be signed among States on a sub-regional basis. A sample copy of an LOA for the Bay of Bengal sub-region is at Appendix D.

3.1.10 The meeting was also provided with a sample copy of an LOA on ATC Co-ordination Procedures as well as guidance material on Procedures for the Assessment for Aircraft Navigation Errors in Support of the Implementation of a Revised ATS Route Structure (50NM Route Spacing) in the EMARSSH Area. These are contained in Appendices E and F respectively.

3.1.11 With regard to the implementation of RVSM planned for November 2003, the meeting was advised that it would require separate LOAs on monitoring of aircraft height keeping performance. This was because RVSM performance monitoring involved monitoring for errors in the vertical plane and would require a different set of procedures from those for RNP 10 navigation performance.

3.1.12 The meeting also discussed at length the need for an LOA on Monitoring as opposed to achieving the same objective by way of an AIP Supplement. It noted that, typically, AIP Supplements did not provide as much information as an LOA would. In addition LOAs would ensure States' commitment to participating in the collection and analysis of navigation errors.

## 3.2 WGS-84 Status in the MID Region

3.2.1 Noting that implementation of WGS-84 was a pre-requisite for the introduction of RNP routes, the meeting was informed of the status of WGS-84 implementation in the MID Region using the uniform reporting format developed by ICAO. A list showing this status is attached at Appendix G.

## 3.3 Implementation of RNP/RNAV in the MID Region

3.3.1 The meeting was informed that the MID region has implemented RNP5 in some parts of the MID region along selected priority ATS routes, some of which are part of the EMARSSH route structure, with effect from 14 June 2001.

3.3.2 The United Arab Emirates (UAE), General Civil Aviation Authority (GCAA) was selected as the Middle East Central Monitoring Agency (MECMA) for ensuring the safe implementation of RNP/RNAV and RVSM in the MID region. MECMA website (http://www.mecma.com).

3.3.3 The meeting was also apprised with the outcome of the MID region RNP/RNAV TF/5 meeting held in Cairo 10-13 June 2001 during which the EMARSSH TF/3 report in relation to implementation of RNP10 was discussed. The MID region RNP/RNAV TF/5 agreed on the following implementation strategy for extension of the RNP/RNAV concept in the MID Region:

a) The MID Region will establish RNP/RNAV areas instead of RNP/RNAV routes with a view to make maximum flexible use of the airspace;

b) The lower limit of the RNP/RNAV areas will be progressively reduced from FL285 to FL195 where feasible, taking into account VHF coverage capabilities;

c) Unidirectional routes will be established in lieu of the present bi-directional routing network with a view to introduce parallel/flexible routes in an RNP 5 environment and thus paving the way for the safe introduction of RVSM in November 2003;

d) The use of GNSS as a primary/supplemental means of navigation will be introduced as soon as possible, in an evolutionary manner, in accordance with the MID Region GNSS implementation strategy, and preferably by January 2002;

e) The tentative date for the implementation of the RNAV/RNP areas is 28 November 2002 *(one year prior to the implementation of RVSM).*

*Note:*

*1. In airspaces/FIRs where the implementation of RNP/RNAV areas is not feasible at time being, a system of RNP/RNAV route will continue be established; and*

*2. Close co-operation/involvement and co-ordination with the Military Authorities is a pre-requisite for the successful implementation of Phase 2 of the RNP/RNAV concept in the MID Region.*

3.3.4 The meeting was presented with a number of the MID region RNP/RNAV TF/5 Conclusions/Decisions that were relevant to implementation in the MID Region. These are attached at Appendix H.

3.4 **CNS/ATM Considerations**

3.4.1 The CNS/ATM considerations for the implementation of the EMARSSH route structure as RNP10 airspace/routes were presented to the meeting. Attention of the meeting was drawn to the provisions of ICAO Manual on Required Navigation Performance (RNP) Doc 9613.

3.4.2 States were advised to note the requirement of development of the following:

i) monitoring and alerting system in case of track deviation or conflict;
ii) flight crew contingency procedures;
iii) ATC contingency procedures.

3.4.3 The meeting was informed of the requirement of direct controller-pilot communication (DCPC) where reduced longitudinal separation minima (e.g. 50NM longitudinal separation in RNP10) is to be applied.

3.4.4 It was noted that for enhancement of air-safety, States may consider implementing additional CNS services, such as:

i) provision of ADS/CPDLC to facilitate surveillance and controller-pilot communication;
ii) provision of SATCOM as a backup to CPDLC;
iii) provision of VHF/HF data link communication to supplement voice communication; and,
iv) additional radar surveillance, where feasible.

3.5 **IATA Meetings in support of the EMARSSH Project**

3.5.1 IATA presented a working paper that summarised the results of three meetings in Karachi and Kabul that were designed to achieve the objectives of EMARSSH. These were meetings between:

- India, Pakistan and IATA. Held on 20-21 August in Karachi, Pakistan.
- Iran, Pakistan and IATA. Held on 23-24 August in Karachi, Pakistan.
- Afghanistan and IATA. Held on 26 August in Kabul, Afghanistan.

3.5.1.1 At the meeting between CAA Pakistan, AAI India and IATA the following was discussed:

**Himalaya–1 and BB-17**: In co-ordination with Pakistan military officials this proposal was realigned from NGJ (Nepal) to INDEK (Pakistan) and is restricted to FL310. The INDEK to Peshawar route joining into AF-4 was approved by the military for night use only at or above FL310. This will satisfy a great portion of the airline's need. Because of the anticipated delay in implementing the very important Kunming – KTM segment of the Himalaya-1, it was suggested to realign BB17 further south to join the Himalaya-1 just north of Delhi. IATA and India agreed to work on route details.

**BB-16**: India would explore the possibility of designing a bi-directional JAL – ASARI route that would route en route traffic on R460/A466 north of Delhi.

**BB-15**: The Pakistan segment of DI – ELKUX route had been approved as originally proposed by IATA in September 2000. However, this does not accommodate the EMARSSH BB-15 proposed route. Therefore the meeting decided to keep the DI – ELKUX routing in Pakistan airspace, then from this FIR boundary crossing point the route would go south of BUTOP (A466W) and Delhi.

**BB-8**: Pakistan had co-ordinated with their military and can approve this route as a high level route due to the proximity of R116 which can be activated up to FL200.

**AS-9**: This route has been implemented from 2200 – 0600 India local time. Local flights were very please with this route and were hoping to see this route implemented during daylight hours as well.

**AS-8**: IATA indicated that if AS-9 turns into a 24H route then AS-8 would not be required. Furthermore it was pointed out that AS-8 and AS-9 would most likely serve local flights only until BB-6, which is an efficient route between SIN/KUL and Mumbai, is implemented.

**AS-7**: This route was approved for westbound use only. India has written to ICAO requesting for a route designator.

**AS-6**: This route was realigned from BILAT – 23 30N 065E – CBH to avoid the Muscat FIR corner and will be discussed further with CAO Iran.

3.5.1.2 At the meeting between CAO Iran, CAA Pakistan and IATA the following was discussed:

**AS-5**: MAROB – Chabahar (CBH). Iran agreed to introduce this route if this was agreeable with Oman.
**AS-6**: BILAT – CBH. Since the BILAT – CBH clips the Muscat FIR, there were 3 options discussed as possible routings:

a) BILAT – CBH
b) BILAT 2330N Jiwani – CBH
c) Bilat 2330N 6500E EGPIC - CBH

**PK-7/AF-7**: Rahim Yar Khan (RK) – Birjand (BRJ) In co-ordination with military authorities, Iran was able to approve this route at or above FL280. IATA would co-ordinate the AF-7 segment with Afghanistan. In co-ordination with their military authorities, Pakistan was able to approve their route segment at or above FL310.

**PK-2/ AF-2/ Persian-3**: Iran has implemented their segment as UL333. Pakistan has approved their portion (PK-2).

**IR-5**: CHARN (V390) – MSD: This impacts military airspace but Iran agreed to extend this route at or above FL310.

3.5.1.3 At the meeting between MCAT Afghanistan and IATA, there was general agreement on all the routes that the IATA JRDG and ICAO EMARSSH had proposed. Other issues discussed included the need for efficient routing from ZAH to Bahrain to accommodate Haj flights, controller training, required LOA's to support the new routes and ground-ground communication with Ashkhabad and Tehran ACC's.

3.5.2 The meeting noted the excellent work done by Afghanistan, India, Iran, Pakistan and IATA and in particular noted the successful routing solutions achieved by Iran and Pakistan with their respective military authorities. It was emphasised to the meeting that the co-operation of military authorities was a vital issue to the success of this project. States were encouraged to continue co-ordination with their military counterparts to seek solutions that would meet both civil and military needs.

3.6 **Modifications to the EMARSSH route structure**

3.6.1 IATA also presented a working paper on suggested changes to previous work of EMARSSH TF/2. These changes not only considered issues related to air traffic management but were also the result of a cost benefit approach to route planning. A working group was formed and with some minor changes, adopted the work presented by IATA.

3.6.2 To assist in airspace planning IATA performed a survey to determine which routes through the Bay of Bengal would have the highest priority with airlines flying to/from Europe. The results of this survey was presented to the meeting. The top 12 routes across the Bay of Bengal are as follows:

| | | |
|---|---|---|
| a) BB16 | c) BB14 | g) BB10 |
| b) BB9 | d) BB8 | h) BB17 |
| c) BB15 | e) BB4 | i) BB2 (tie with BB6) |
| d) BB3 | f) BB7 | j) BB6 (tie with BB2) |

3.7 **Report of the ATS routes Group**

3.7.1 The ATS routes group of EMARSSH TF/5 consisting of States concerned and IATA reviewed and made adjustments where required to the routes proposed by EMARSSH TF/2 and EMARSSH TF/3 in the Bay of Bengal and Arabian Sea.

*Bay of Bengal ATS Route Network*

3.7.2 Proposed amendments to EMARSSH routes in the Bay of Bengal area are shown in Appendix I.

3.7.3 With regard to Appendix I, significant amendments include the addition of a route from KUL to MABIX on BB1 as well as the realignment of BB6 to intercept BB5 at SAMAK. It was also proposed that BB7 be realigned and extended to join BB6 at SAMAK. This was to facilitate a corresponding adjustment of BB8 southward.

3.7.4 In reviewing earlier work completed by EMARSSH TF/2, the Group was of the view that BB11 (RANONG to Calcutta), which had been proposed as a part-time route, could instead be implemented permanently as a replacement of an existing domestic ATS route extending from 1800N 09020E on BB10 to Calcutta.

*Arabian Sea ATS Route Network*

3.7.5 Oman proposed new entry/exit points on boundaries of the Muscat/Mumbai FIRs which affects the EMARSSH TF/3 ATS route network in the Mumbai FIR. The proposed changes would allow spacing of 50 NM or more between airways by assigning RNP 10 in the Mumbai FIR, and would also permit two additional entry/exit fixes on the boundaries of the Muscat/Mumbai FIRs. Details of the Groups proposals are at Appendix I to this agenda item.

3.7.7 India had no objections to the new FIR boundary crossings as proposed by Oman. However, India indicated that EMARSSH route AS3 (new boundary point Muscat Mumbai FIR 211230N 0613830E to 1730N 06850E to 1159N 08000E then to position VIROT then BANDA ACEH) might require a small deviation over the Arabian Sea near Goa, due to presence of Danger Area (D17). India will coordinate with their military authorities.

3.8 **Report of the AIS routes Group**

3.8.1 Taking into consideration the extent of airspace and number of FIRs' covered by the EMARSSH Project, the AIS group was requested to itemise the tasks required to ensure a smooth implementation in the AIS field. The AIS group referred to earlier work completed within TF/3 (Cairo),

and considered the items listed under EMARSSH TASK LIST and SCHEDULE (Asia Pacific and Middle East).

3.8.2 The Task Lists were reviewed and considered in the light of recent experiences associated with implementation of other major Inter-regional Projects. The meeting was presented with several recent examples, where late notification in relation to AIS had seriously jeopardised the timely introduction of major ATS initiatives.

3.8.3 The AIS group determined that the following issues need to be addressed in the following order of priority:

| **Task** | **Target Date** |
|---|---|
| Nomination of a Point of Contact (POC) in each State and Regional Co-ordinator | 31 December 2001 |
| Prepare and publish the initial notification AIC by each State | 15 January 2002 |
| Prepare amendment to Regional Air Navigation Plans | ICAO |
| Establishment of a Transition Co-ordination Team (TCT) | TF/6 (February 2002) |
| Prepare and publish AIP Supplement providing full route specifications | AIRAC date August 2002 |
| Develop transition procedures | TF/7 and ongoing (2002) |
| Publish Transition NOTAM | 31 October 2002 |

3.8.4 The nominated Points of Contact are shown at Appendix J and the AIC (template) for use as guidance by individual States, is attached at Appendix K.

3.8.5 In addition to the above AIS tasks, a full list of required tasks for the implementation of EMARSSH has been prepared, and this is attached at Appendix L.

3.9 **Non RNAV Operations within Oceanic Airspace**

3.9.1 The meeting was advised that due to equipage limitations on some aircraft operating on a regular basis within certain oceanic areas, provision should be made for these aircraft to conduct Non-RNAV operations.

3.9.2 The meeting agreed that conventional routes may be established over oceanic airspace, including below RNAV routes where required, for aircraft not compliant for RNAV. In such cases the RNAV route may be restricted with a lower limit of FL270, with FL260 as the upper limit of the conventional route.

3.10 **Iranian progress on implementation of EMARSSH Route Structure**

3.10.1 The Iranian Delegation informed the meeting, that following decisions reached at EMARSSH TF/3 and TF/4, on implementing PERSIAN 1,2,3,4,5,6,7 and 8, ATS Routes PERSIAN 2 and PERSIAN 3 (UL123 and UL333 respectively), had been implemented.

3.10.2 The Iranian Delegation also informed the meeting, that Iran is ready to implement PERSIAN 1 with the following proposed minor changes:

UMH (Uromieh) – KRD (Koram Abad) – SIRI (Siri) – SHJ (Sharjah)

3.10.3 The meeting was also informed that an ATS co-ordination meeting between Iran and the UAE will held soon, to finalise ATS matters for implementation of PERSIAN 1.

3.10.4 The meeting was also advised of Iranian ATS effort on implementing PERSIAN 4 between ARD (Ardabil) – SEVAN, after Armenia and Azerbaijan agreement is received. The required meeting will be held shortly between Iran, Azerbaijan and Armenia.

3.10.5 Iran agreed to promulgate a NOTAM for implementation of PERSIAN 5, with minor changes as follows:

BJD – DNZ – ULDUZ

3.10.6 This will be followed by a Co-ordination meeting for the rest of the EMARSSH routes beyond Iranian Territory between Iran and Afghanistan.

a) PERSIAN 6: Iran agreed to implementation with small changes as follows: ZAHEDAN – TABAS – DNZ – ULDUZ

b) PERSIAN 7: Iran agreed to implementation with minor changes as follows: ZAHEDAN [via G208] – TRN (DIR) – Tabriz

c) Persian 8: YZD – SAVEH, Iran is ready for implementation

3.10.7 Iran will conclude the relative steps to implement the above-said ATS routes as part of the EMARSSH Project by the first quarter of 2002.

3.10.8 The EMARSSH TF/5 agreed on implementation the aforesaid ATS route as PERSIAN 1,4,5,6,7 and 8 subject to co-ordination with the neighbouring States like UAE, Armenia, Azerbaijan and Afghanistan.

3.10.9 In addition to the above, the Iranian delegation proposed the following ATS route structure as part of EMARSSH Project in the following order:

RK [DIR] – BJD – R794 – DN – B411 – TRN – G208 [DIR] – TBZ as PERSIAN 9

3.10.10 Since alternative routes of flight during peak periods for long/medium – haul flights was of a concern to all operators, EMARSSH TF/5 agreed on implementing PERSIAN 9 as part of EMARSSH route structure, subject to co-ordination between Iranian and Afghanistan ATS Authorities.

3.10.11 The meeting extended their appreciation to the Iranian delegation, for their excellent level of co-operation and consideration in favour of the EMARSSH Project and the Contingency Routes – Asia, Middle East and Europe (CRAME).

3.11 **EMARSSH initiatives by Myanmar**

3.11.1 The secretariat presented information of behalf of Myanmar on their progress in relation to the EMARSSH project.

3.11.2 Comments by Myanmar on the EMARSSH route structure were in general agreement with the work progressed at previous meetings as well as discussions, which took place during this meeting. Nevertheless, there were some items, which required further clarification with Myanmar. The meeting was advised that ICAO and IATA would undertake to follow-up on these matters.

**Agenda item 4: Any Other Business**

4.1 **Air Navigation Charges**

4.1.1 IATA raised the issue of Air Navigation charges in the context of EMARSSH benefits and Minimum Cost Tracks (MCT). IATA warned that the high cost of Air Navigation charges in some States could lead to some Airlines avoiding certain FIRs, in spite of the efforts which have been taken in shortening routes and updating/modernising the ATS systems in those States.

4.1.2 The Iranian Core Team member expressed the Iran Civil Aviation views on the subject of Air Navigation charges. Iran informed the meeting, that even though there had been a huge investment in the modernisation of ATS/Radar systems in the Tehran FIR, Iran would maintain present charges for the next four years.

4.1.3 Iran further informed the meeting that there had not been any increase in Air Navigation charges for the past nine years, and that these matters were recently reported to the Economic Commission of the 33rd ICAO Assembly.

4.1.4 Iran also recommended that States, ICAO and IATA consider establishing a unified system of Air Navigation charges, as practised by Eurocontrol, based on ICAO references and the types of services provided to airlines.

4.2 **Date and Venue for next Meeting**

4.2.1 The sixth meeting of EMARSSH will be held between 18-22 February 2002. The venue is yet to be finalized.

4.2.2 Iran informed the meeting that they would be willing to host the seventh meeting of EMARSSH in Tehran on 13-17 May 2002. The ICAO MID Office will co-ordinate with Iran on this matter.

……

## LIST OF PARTICIPANTS

| STATE/NAME | DESIGNATION/ADDRESS | TEL/FAX/TLX/AFTN/SITA/ E-MAIL |
|---|---|---|
| **AUSTRALIA** | | |
| Mr. Tony Allison | Manager Brisbane Operations<br>Brisbane Centre<br>Airservices Australia<br>Locked Bag 747<br>Eagle Farm QLD 4009<br>Australia | Tel: 61-7-3866 3471<br>Fax: 61-7-3866 3599<br>E-mail: tony.allison@airservices.gov.au |
| **INDIA** | | |
| Mr. P.C. Goel<br>(Secretariat/Core Team Member) | Executive Director (Air Traffic Management)<br>Airports Authority of India<br>Rajiv Gandhi Bhavan<br>Safdarjung Airport<br>New Delhi 110003<br>India | Tel: 91-11-463 1684<br>Fax: 91-11-461 1078<br>E-mail: aaiedatm@ndf.vsnl.net.in |
| Mr. R.C.Khurana | General Manager (Air Traffic Management)<br>Airports Authority of India<br>Rajiv Gandhi Bhavan<br>Safdarjung Airport<br>New Delhi 110003<br>India | Tel: 91-11-465 2648<br>Fax: 91-11-461 1078<br>E-mail: gmaraaai@vsnl.net |
| Mr. D.P.Arora | General Manager (S&P)<br>Airports Authority of India<br>Rajiv Gandhi Bhavan<br>Safdarjung Airport<br>New Delhi 110003<br>India | Tel: 91-11-464 5606<br>Fax: 91-11-461 1078<br>E-mail: gmspaai@vsnl.net |
| Mr. S P Sikka | Addl. General Manager (Ops)<br>Airports Authority of India<br>Rajiv Gandhi Bhavan<br>Safdarjung Airport<br>New Delhi 110003<br>India | Tel: 91-11-465 2649<br>Fax: 91-11-461 1078<br>E-mail: aaiedatm@ndf.vsnl.net.in |

| | | |
|---|---|---|
| Mr.V Somasundaram | Addl. General Manager<br>Airports Authority of India<br>CSI Airport<br>MUMBAI<br>India | Tel: 91-22-839 4107<br>Fax: 91-22--839 4107 - 4109<br>E-mail: gmawraai@bol.net.in |
| Mr. K.V.Titus | Addl. General Manager<br>AIR INDIA<br>MUMDAI<br>India | Tel: 91-22-615 7777<br>Fax: 91-22-615 7059<br>E-mail: opai@bom3.vsnl.net.in |
| Mr. D.K.Pahwa | Dy. Manager (FLT OPS)<br>India Airlines Ltd.<br>Safdarjung Airport<br>New Delhi 110003<br>India | Tel: 91-11-469 7390<br>Fax: 91-11-464 6921<br>E-mail: dkpahwa@hotmail.com |
| Mr. A.K.Gupta | Dy. Director Operations (Navigation)<br>Indian Air Force<br>Rafi Marg, Vayu Bhawan<br>New Delhi<br>India | Tel: 91-11-337 7547<br>Fax:<br>E-mail: ashwanigupta@netpracker.com |
| Gp. Capt. Kishore Dash | JT. Director Operations (Navigation)<br>Indian Air Force<br>Rafi Marg, Vayu Bhawan<br>New Delhi<br>India | Tel: 91-11-337 7547<br>Fax: 91-11-337 7544<br>E-mail: kddass@vsnl.com |
| **INDONESIA** | | |
| Mr. Nanang Swastya Taruf | Deputy Director Aviation Safety (Air Traffic Service)<br>Directorate of Aviation Safety – DGAC of Indonesia<br>Medan Merdeka Barat no. 8, fl-23rd<br>Jakarta Pusat,<br>Indonesia 10120 | Tel: +62-21-3506451<br>Fax: +62-21-3506451<br>E-mail: swastya@pacific.net.id<br>cnsatm@ekilat.com |
| Mr. Novaro Martodihardjo | Asst. Director Air Traffic Services<br>PT. Angkasa Pura II<br>Bandara Soekarno-Hatta<br>Indonesia | Tel: 62-21-5506148<br>Fax: 62-21-5501064<br>E-mail: novaro95@undo.net.id |

| | | |
|---|---|---|
| Mr. Mulyono D S | Operational Director<br>PT. Angkasa Pura II<br>Bandara Soekarno-Hatta<br>Indonesia | Tel: 021-550 5048<br>Fax: 021-550 5049<br>E-mail : dirops@angkasapura2.co.id |
| Mr. IK. Maruta Sena | Manager Airport & Airspace Technology<br>Garuda Indonesia<br>Garuda Operation Centre (GOC)<br>Sentra Operasi 3/F Soekarno-Hatta Int'l Airport<br>P.O. Box 1004, BUSH 19120<br>Cengkareng, Indonesia<br>Indonesia | Tel: 62-21-550 1521<br>Fax: 62-21-550 1528<br>E-mail: maruta@garuda-indonesia.com |
| **IRAN, ISLAMIC REP.** | | |
| Mr. Davood Khodaverdi<br>(Secretariat/Core Team Member) | DG Legal, Aeronautical and International Affairs<br>Civil Aviation Organization<br>Mehrabad International Airport, Central Building<br>P.O. Box 13445-1798<br>Tehran<br>Iran, Islamic Republic of | Tel: 9821 6025115<br>Fax: 9821 6025246<br>E-mail: davood@itair.com<br>Davoodkhodaverdi@hotmail.com |
| Mr. Ali Golmohammadi Daryakenari | DG of ATS<br>Civil Aviation Organization<br>Mehrabad International Airport, Central Building<br>P.O. Box 13445-1798<br>Tehran<br>Iran, Islamic Republic of | Tel: 9821 452 5493<br>Fax: 9821 452 7194<br>E-mail: ats_dg@iricao.org |
| **MALAYSIA** | | |
| Mr. Chew Lam Leong | Operations Officer (ATC Procedures)<br>Air Traffic Control Centre<br>Department of Civil Aviation<br>Sultan Abdul Aziz Shah Airport<br>47200 Subang, Selangor Darul Ehsan<br>Malaysia | Tel: 603 784 73573<br>Fax: 603 784 73572<br>E-mail: llchew@tm.net.my |

| | | |
|---|---|---|
| Capt. Mohd. Azharuddin Osman | Asst. General Maanger Flt Ops (Ops)<br>Malaysia Airlines<br>Flight Operations Division<br>4th Floor, South Support Facility Building<br>South Support Zone, 64000, KLIA<br>Sepang, Selangor Darul Ehsan<br>Malaysia | Tel: 603-852 52973<br>Fax: 603-852 53109<br>E-mail: maosman@mas.com.my |
| **NEPAL** | | |
| Mr. Ramesh Man Joshi | Deputy Director General<br>Civil Aviation Authority of Nepal<br>Head Office, Babar Mahal<br>Kathmandu, Nepal P.O. BOX 1932 | Tel: 977-1-262532<br>Fax: 977-1-262324<br>E-mail: caan@cnsatm.wlink.com.np |
| Mr. Mohan Adhikari | Deputy Director, TIACAO<br>Civil Aviation Authority of Nepal<br>Tribhuvan International Airport<br>Gauchar, Kathmandu<br>Nepal | Tel: 977-1-498775 , 277462<br>Fax: 977-1-474180 , 471411<br>E-mail: tiao@mos.com.np |
| Mr. Chiniya Man Shakya | Chief Officer<br>Civil Aviation Authority of Nepal<br>Head Office, Babar Mahal<br>Kathmandu, Nepal | Tel: 977-1-262518<br>Fax: 977-1-262516<br>E-mail: caan@cnsatm.wlink.com.np |
| **OMAN** | | |
| Mr. Saud Humaid Al Athubi | EMARSSH Co-ordinator<br>P.O.BOX 185<br>PC111 Seeb<br>OMAN | Tel: 009689321664<br>Fax: 00968519939<br>Email : saud@dgcam.com.om |
| **SINGAPORE** | | |
| Mr. Mervyn Fernando<br>(Secretariat/Core Team Member) | Senior ATC Manager (Airspace)<br>Civil Aviation Authority of Singapore<br>Singapore Changi Airport<br>P.O. Box 1<br>Singapore 918141 | Tel: 65-541-2457<br>Fax: 65-545-6516<br>E-mail: mervyn_fernando@caas.gov.sg |
| **SRI LANKA** | | |
| Mr. Ranjith mahinda Silva | Chief Air Traffic Controller (CNS/ATM)<br>Airport & Aviation Services (Sri Lanka) Limited<br>Colombo Airport<br>Ratmalana, Sri Lanka | Tel: 94-1-635105<br>Fax: 94-1-633488<br>E-mail: rmsaasl@slt.lk |

| | | |
|---|---|---|
| **THAILAND** | | |
| Miss Watcharin Jarunud | Director of Communication and Air Traffic Control Division<br>Department of Aviation<br>71 Soi Ngarmduplee, Rama IV Road<br>Bangkok 10120, Thailand | Tel: 66-2-286 8159<br>Fax: 66-2-286 8159 |
| Mr. Aphinun Vannangkura | Director of Area Control Centre<br>Aeronautical Radio of Thailand Ltd.<br>102 Ngarmduplee<br>Tungmahamek<br>Bangkok 10120<br>Thailand | Tel: 66-2-285 9057<br>Fax: 66-2-285 9389 |
| **IATA** | | |
| Mr. David Behrens<br>(Secretariat/Core Team Member) | Assistant Director Infrastructure – Asia/Pacific<br>International Air Transport Association<br>77 Robinson Road<br>#05-00, SIA Building<br>Singapore 068896 | Tel: 65-239 7267<br>Fax: 65-536 6267<br>E-mail: behrensd@iata.org |
| Mr. Owen B. Dell | Manager International Operations<br>Cathay Pacific Airways Limited<br>9/F Central Tower, Cathay Pacific City<br>8 Scenic Road<br>Hong Kong International Airport<br>Lantau, Hong Kong, China | Tel: 852 2747 8826<br>Fax: 852 2141 8822<br>E-mail: owen_dell@cathaypacific.com |
| Capt. K.K. Goh | Management Pilot (Special Duties) – Technical<br>Flight Operations Division<br>Singapore Airlines Limited<br>SIA Training Centre 04-C<br>720 Upper Changi Road East<br>Singapore 486852 | Tel: 65-5403694<br>Fax: 65-5429564<br>SITA: SINONSQ<br>E-mail: kk_goh@singaporeair.com.sg |
| Mr. Robert H. Everest | Manager Flight Dispatch & Air Traffic Management<br>EMIRATES AIRLINE<br>P.O. Box 686<br>Dubai<br>United Arab Emirates | Tel: 009 714 7036495<br>Fax: 7036489<br>E-mail: bob.everest@emirates.com |

| | | |
|---|---|---|
| **IFALPA** | | |
| Capt. Minoo Wadia | IFALPA Representative<br>Air India Complex<br>Old Airport, Kalina<br>Santacruz (E), Mumbai – 400029<br>India | Tel: 91-22-6157282<br>Fax: 91-22-615 7325<br>E-mail: fip@indianpilots.org<br>Minoow@indiapilots.org |
| **SECRETARIAT** | | |
| Mr. M. Khonji | Deputy Regional Director<br>ICAO MID Regional Office<br>P.O. Box 85<br>Cairo Airport Terminal One Post Office<br>Cairo 11776, Egypt | Tel: 202-267 4841 ext 116<br>Fax: 202-267 4843<br>E-mail: mkhonji@cairo.icao.int |
| Mr. John Richardson | Regional Officer, ATM<br>ICAO Asia & Pacific Office<br>P.O.Box 11 Samyaek Ladprao<br>Bangkok – 10901<br>Thailand | Tel: 66-2-5378189<br>Fax: 66-2-5378199<br>AFTN: VTBBICOX<br>SITA: BKKCAYA<br>E-mail: jrichardson@bangkok.icao.int |
| Mr. Ron Rigney | Flight Information Region Manager<br>Brisbane Centre<br>Airservices Australia<br>Locked Bag 747<br>Eagle Farm QLD 4009<br>Australia | Tel: 61-7-3866 3228<br>Fax: 61-7-3866 3226<br>E-mail: ron.rigney@airservices.gov.au |
| Mr. P.C. Goel | Executive Director (Air Traffic Management)<br>Airports Authority of India<br>Rajiv Gandhi Bhavan<br>Safdarjung Airport<br>New Delhi 110003, India | Tel: 91-11-463 1684<br>Fax: 91-11-461 1078<br>E-mail: aaiedatm@ndf.vsnl.net.in |
| Mr. Mervyn Fernando | Senior ATC Manager (Airspace)<br>Civil Aviation Authority of Singapore<br>Singapore Changi Airport<br>P.O. Box 1<br>Singapore 918141 | Tel: 65-541-2457<br>Fax: 65-545-6516<br>E-mail: mervyn_fernando@caas.gov.sg |

| | | |
|---|---|---|
| Mr. Davood Khodaverdi | DG Legal, Aeronautical and International Affairs<br>Civil Aviation Organization<br>Mehrabad International Airport, Central Building<br>P.O. Box 13445-1798<br>Tehran<br>Iran, Islamic Republic of | Tel: 9821 6025115<br>Fax: 9821 6025246<br>E-mail: davood@itair.com<br>Ircaoint@hotmail.com |
| Mr. David Charles Behrens | Assistant Director<br>Operations & Infrastructure – Asia/Pacific<br>International Air Transport Association (IATA)<br>71 Robinson Road<br>#05-00, SIA Building<br>Singapore 068896 | Tel: 65-239 7267<br>Fax: 65-536 6267<br>E-mail: behrensd@iata.org |

## LIST OF PAPERS

### WORKING PAPERS

| WP No. | Agenda Items | Presented by | Subject |
|---|---|---|---|
| 1 | 1 | Secretariat | Provisional Agenda |
| 2 | 2 | Secretariat | Review of progress from previous EMARSSH Task Force Meetings. |
| 3 | 3 | Secretariat | Implementation of RNP/RNAV in the Mid Region. |
| 4 | 3 | Australia | EMARSSH Phase I implementation Australia/ Indonesia/ Malaysia/Singapore 29th Nov 2001. |
| 5 | 2 | Secretariat | Letters of Agreement on monitoring of Aircraft Navigation Error and Air Traffic Control Coordination Procedure in support of the implementation of a revised ATS route structure [RNP 10/RNP5] in the EMARSSH area. |
| 6 | 3 | Secretariat | Implementation of the EMARSSH Route Structure: CNS/ATM Considerations |
| 7 | 3 | IATA | Continued work of the IATA Joint Route Development Group in support of the EMARSSH project. |
| 8 | 2 | IATA | Suggested charges to the EMARSSH route structure. |
| 9 | 3 | Secretariat | Establishment of Airspace Safety Requirements for Implementation of EMARSSH |
| 10 | 2 | Sultanate of Oman | Change to entry/exit points at the Muscat/Mumbai FIRs |
| 11 | 3 | Islamic Republic of Iran | Review Progress of previous EMARSSH routes within Tehran FIR |
| 12 | 3 | Malaysia | Provision for non—RNAV operations. |

### INFORMATION PAPERS

| IP No. | Agenda Items | Presented by | Subject |
|---|---|---|---|
| 1 | 1 | Secretariat | List of Working and Information Papers |
| 2 | 2 | Myanmar | Revised ATS Route Structure |
| 3 | 3 | Secretariat | Status of Implementation and Uniform Format for Reporting of WGS-84 in the Mid Region |
| 4 | 3 | India | Modernization of Air Traffic Services |
| 5 | 3 | Malaysia | Requirement for Area Navigation [RNAV] on the revised ATS route structure Asia to Middle East/ Europe, South of the Himalayas. |
| 6 | 2 | Indonesia | Communication and Surveillance facilities improvement in Jakarta FIR |

**DISCUSSION PAPER**

| DP | Agenda Items | Presented by | Subject |
|---|---|---|---|
| 1 | 3 | Myanmar | Revised ATS Route Structure |

**FLIMSY PAPER**

| Flimsy No. | Agenda Items | Presented by | Subject |
|---|---|---|---|
| 1 | 3 | - | EMARSSH AIS Group |
| | | | |

--END--

# AGENDA

Agenda Item 1: Adoption of the Provisional Agenda.

Agenda Item 2: Issues related to the EMARSSH ATS route network.

Agenda Item 3: Review action plan for the implementation of the EMARSSH route network.

Agenda Item 4: Any other business.

…….

# SAMPLE

# OPERATIONAL LETTER OF AGREEMENT

# BETWEEN

| | |
|---|---|
| Name of Civil Aviation Organisation | Name of Country |
| Name of Civil Aviation Organisation | Name of Country |
| Name of Civil Aviation Organisation | Name of Country |
| Name of Civil Aviation Organisation | Name of Country |

# FOR

# MONITORING OF AIRCRAFT NAVIGATION ERRORS

# IN THE

# BAY OF BENGAL SUB-REGION

# Operational Letter of Agreement

## Document Management

**Table of Contents**



**Checklist of Effective Pages**

| Subject | Pages | Issue Date |
|---|---|---|
| Letter of Agreement | 1 - 10 | 28 Nov 2002 |
| Attachment A-Navigation Error Report | A1 - 6 | 28 Nov 2002 |

# Operational Letter of Agreement

## Overview

**Introduction**

The following document is a Letter of Agreement (LOA) between the Air Traffic Service (ATS) authorities shown on page one of this document. The letter of agreement details monitoring procedures between the following ATS units:

State A ACC
State B ACC
State C ACC
State D ACC
State E ACC
State F ACC
State G ACC
State H ACC
State I ACC
State J ACC

**Objective**

The objective of this LOA is to define agreed procedures for the monitoring, notification, investigation, analysis and reporting of aircraft navigation errors in respect of aircraft to which the 50NM lateral separation standard and a 10 minute or 80NM RNAV longitudinal separation minima is applied when operating on the following designated RNAV routes (or within the following FIRs/airspace):

| | | |
|---|---|---|
| L___ | M___ | N___ |
| L___ | M___ | N___ |

**Scope**

The procedures contained in this LOA implement the performance monitoring requirements associated with the introduction of the 50NM lateral separation standard, and for the reporting and monitoring of gross lateral and longitudinal navigational errors.

For the purposes of this LOA, the term 'Service Providers' refers to organisations which are responsible for the provision of Air Traffic Control (ATC) services.

The term 'Regulatory Authority' refers to those organisations responsible for the investigation of navigational errors. In some cases, the Regulatory Authority may be the same as the Service Provider.

**Effective Date**

This letter of agreement becomes effective on 28 Nov 2002.

# Operational Letter of Agreement

## Overview, Continued

**Background**

The use of these lateral and longitudinal separation standards is restricted to aircraft which meet the requirements detailed in the respective States' AIP Supplements. This includes a requirement for Required Navigation Performance (RNP) 10 approval and it is the responsibility of the operator to ensure that such requirements are satisfied when so declared.

RNP 10 approval includes operators meeting certain requirements with regard to crew training and in-flight operating procedures. The responsibility for approval for such operations rests with the State of Registry of the Operator.

Monitoring navigation errors is a joint responsibility between the aircraft operators, the States of Registry, and the ATC providers. There are established requirements for the operators to monitor navigation performance under the terms of their RNP 10 approval. This document sets out the responsibilities and procedures to be followed by staff of the signatory organisations to this LOA.

**Area of Applicability**

The procedures outlined in this LOA shall be applied to all aircraft operating on the following designated RNAV routes (or within the following FIRs/airspace):

| | | |
|---|---|---|
| L___ | M___ | N___ |
| L___ | M___ | N___ |

# Operational Letter of Agreement

## Monitoring Procedures

**Lateral Deviations**

Monitoring shall be based on radar observations.

When the radar controller observes a lateral deviation of 15NM or more, the controller shall:

- immediately advise the pilot in command; and
- provide the 'duty supervisor' with the necessary information to enable **Part 1** of the *Navigation Error Investigation Form* (as shown in Attachment A) to be completed.

Where an aircraft is off-track as the result of an ATC approved diversion (e.g. due weather), no notification under the terms of this Letter of Agreement need be submitted.

**Longitudinal Deviations**

Monitoring of longitudinal errors shall be accomplished by reporting occurrences where the observed longitudinal separation, following a check, is either less or more than the expected longitudinal separation as detailed below.

Where a time-based standard is used, this check will follow the receipt of a routine position report. Notification, in accordance with Attachment A, shall be submitted in all cases where:

- the separation standard is infringed; or
- the expected time between two aircraft varies by 3 minutes or more, even if the applicable separation standard is not infringed; or
- a pilot estimate varies by 3 minutes or more from that advised in a routine position report.

Where a distance-based standard is used, the check may rely on ADS information or radar observations. It may depend on RNAV distance reports. Notification, in accordance with Attachment A, shall be submitted in all cases where:

- the separation standard is infringed; or
- the expected distance between two aircraft varies by 10NM or more, even if the applicable separation standard is not infringed.

# Operational Letter of Agreement

## Notification Procedures

**Action by ATC Unit**

The duty supervisor, when advised of the deviation, shall be responsible for completion and submission of a *Navigation Error Investigation Form*.

A copy of the aircraft's flight plan shall be attached to the *Navigation Error Investigation Form*, and forwarded to the Chief of ATC.

The Chief of ATC shall forward copies of the *Navigation Error Investigation Form* (Parts 1 to 4) to the aircraft operator and the State of Registry of the aircraft or the State of the Operator, as considered appropriate.

In addition, the copy for the aircraft operator shall be sent with a covering letter (as provided in Attachment A) requiring the operator to complete the *Navigation Error Investigation Form* and to provide reasons for the error.

# Operational Letter of Agreement

## Investigation Procedures

**Investigation Procedures**

The investigation of errors notifiable under this Letter of Agreement is a joint responsibility of the operator, the ATC Authority of the airspace in which the error occurred, and the State of Registry or State of the Operator of the aircraft involved.

The initial investigation shall be undertaken by the aircraft operator, who is responsible for supplying all data and comments needed to complete the form at Attachment A. The completed reports are to be returned by the operator to the originating ATC Authority. For aircraft registered in States not included in this LOA, these reports are also to be forwarded to the State of Registry of the aircraft or the State of the Operator.

Further action by States other than signatories to this LOA is outside the scope of this agreement, and shall be at the discretion of that State.

On receipt of the completed report from the aircraft operator, the relevant ATC Authority will first check that all information required has been supplied and, if necessary, the ATC Authority shall request any further information from either the operator, the State of the Operator, or the State of Registry of the aircraft.

If the completed form from the aircraft operator is not received within 14 days of the date of dispatch, the ATC Authority will contact the operator and request the completed form.

Once the completed information has been received, the ATC Authority will complete Part 5 of the *Navigation Error Investigation Form* as detailed in Attachment A. The cause of the error is to be classified in accordance with the criteria specified in Part 5.

The decision as to whether any further investigation is warranted will be taken by the ATC Authority based on their assessment of the seriousness of the error.

# Operational Letter of Agreement

## Analysis of Errors & Reporting

At the end of each month, Service Providers shall forward to the [RMA], a copy of all completed *Navigation Error Investigation Forms* (Parts 1 to 5) covering reported errors or nil reports for that month, together with data on the number of movements on the routes being monitored as recorded by the relevant Flight Data Processing System, or other auditable means.

[RMA] shall be responsible for calculation of the frequency of the errors, in accordance with Doc 7030.

Each six months, the Monitoring Authority should prepare an assessment schedule setting out the results of the monitoring for the preceding six-month period and forward a copy of this schedule to:

a. all signatory States to the Monitoring Letter of Agreement; and
b. The Chairman of the APANPIRG ATS/AIS/SAR Sub-Group through the ICAO Bangkok Office.

## Permitted Error Rate Exceeded

Where the summary statistics show a long term trend which could result in the Permitted Error Rate being exceeded, ATC Authorities of the States concerned, in conjunction with the ICAO Regional Office, will jointly consider the causes, to determine if the problems can be eliminated, and to take appropriate remedial action.

## Revision

This LOA shall remain in force until it is cancelled or superseded.

For any reason, which might make it advisable to change this agreement and its associated attachments, the interested State shall propose the pertinent revision.

# Operational Letter of Agreement

## Authority

| | |
|---|---|
| Name of Country | Name of authorised signatory<br>Designation<br>Organisation |
| Name of Country | Name of authorised signatory<br>Designation<br>Organisation |
| Name of Country | Name of authorised signatory<br>Designation<br>Organisation |
| Name of Country | Name of authorised signatory<br>Designation<br>Organisation |

*Continued on next page*

# Operational Letter of Agreement

## **Authority,** Continued

| | |
|---|---|
| Name of Country | Name of authorised signatory<br>Designation<br>Organisation |
| Name of Country | Name of authorised signatory<br>Designation<br>Organisation |
| Name of Country | Name of authorised signatory<br>Designation<br>Organisation |
| Name of Country | Name of authorised signatory<br>Designation<br>Organisation |

# Operational Letter of Agreement

## Attachment A

## NAVIGATION ERROR REPORT

Dear

Air Traffic Control service providers are monitoring traffic on routes in the [*name of region*] area, as part of the implementation of reduced separation minima on those routes.

These procedures require the reporting and investigation of:

i) lateral tracking errors of 15NM or more;

ii) variations of longitudinal separation of three minutes or more; or

iii) variations of longitudinal separation of 10NM or more.

A ***Navigation Error Investigation Form*** relating to one of your aircraft is enclosed.

An investigation of this occurrence is required. A detailed explanation should be provided **within 10 days**, using the attached ***Navigation Error Investigation Form***. In your reply, you are also requested to indicate any corrective action taken to prevent future occurrences.

Yours faithfully,

# NAVIGATION ERROR INVESTIGATION FORM

**Instructions for Service Provider responsible officer:**

Please ensure that **Part 1** of this form has been completed to the maximum extent possible, and distribute according to the requirements of the Letter of Agreement on monitoring of aircraft navigation errors in the [*name of region*] airspace.

**Instructions for aircraft owner/operator:**

Please supply any details required in **Part 1** of this form which have not already been completed, together with the information requested in **Parts 2, 3 and 4** (if applicable), and return to:

[*appropriate Regulatory Authority*]

**Instructions for Investigating Agency (Regulatory Authority) :**

Please complete **Part 5** of this form and return to:

[*appropriate Service Provider*]

# NAVIGATION ERROR INVESTIGATION FORM

**PART 1**

**To be completed by responsible officer in the Service Provider (and aircraft owner/operator if needed)**

| | | |
|---|---|---|
| ATC Unit Observing Error: | | |
| Date/Time (UTC): | | |
| Type of Error: (tick one) ❑ LATERAL ❑ LONGITUDINAL | | |
| **Details of Aircraft** | | |
| | **First Aircraft** | **Second Aircraft** (When longitudinal deviation observed) |
| Aircraft Identification: | | |
| Name of Owner/Operator: | | |
| Aircraft Type: | | |
| Departure Point: | | |
| Destination: | | |
| Route Segment: | | |
| Cleared Track: | | |
| Position where error was observed:<br>(BRG/DIST from fixed point or LAT/LONG) | | |
| Extent of deviation - magnitude and direction:<br>(NM for lateral, min/NM for longitudinal) | | |
| Flight Level: | | |
| **For All Errors** | | |
| Action taken by ATC: | | |
| Other comments: | | |

****(Please Attach ATS Flight Plan)**

# NAVIGATION ERROR INVESTIGATION FORM

| **PART 2**<br>**Details of Aircraft, and Navigation and Communications Equipment Fit**<br>**(To be completed by aircraft owner/operator)** | | | |
|---|---|---|---|
| **LRNS** | **Number of Systems (0,1,2 etc.)** | **Make** | **Model** |
| INS | | | |
| IRS | | | |
| GNSS | | | |
| FMS | | | |
| Other (please specify) | | | |
| **COMS** | | | |
| HF | | | |
| VHF | | | |
| SATCOM | | | |
| CPDLC | | | |
| Which navigation system was coupled to the autopilot at the time of observation of the error? | | | |
| Which NAV MODE was selected at the time of observation of the error? | | | |
| Which coms system was in use at the time of observation of the error? | | | |
| Aircraft registration and model/series | | | |
| Was the aircraft operating according to RNP 10 requirements? | | ❑ Yes ❑ No | |

# NAVIGATION ERROR INVESTIGATION FORM

**PART 3 - Detailed description of incident**

**(To be completed by owner/operator - use separate sheet if required)**

Please give your assessment of the actual track flown by the aircraft, and the cause of the deviation:

Corrective action proposed:

**PART 4 -To be completed by owner/operator, only in the event of partial or total navigation equipment failure.**

| **Nav System Type** | **INS** | **IRS/FMS** | **Other (Please specify)** |
|---|---|---|---|
| Indicate the number of units of each type which failed | | | |
| Indicate position at which failure(s) occurred | | | |
| Give an estimate of the duration of the equipment failure(s) | | | |
| At what time were ATC advised of the failure(s)? | | | |

# NAVIGATION ERROR INVESTIGATION FORM

**PART 5 - To be completed by investigating agency**

| | | |
|---|---|---|
| Have all required data been supplied? | ❑ Yes | ❑ No |
| Is further investigation warranted? | ❑ Yes | ❑ No |
| Will this incident be the subject of a separate report? | ❑ Yes | ❑ No |

General comments:

Classification: (please circle) A B C D E F G H I

**CLASSIFICATION OF GROSS NAVIGATION ERRORS**

| Class | Cause |
|---|---|
| A | Aircraft not approved to RNP 10 |
| B | ATC system loop error |
| C | Waypoint insertion error, due to correct entry of incorrect position or incorrect entry of correct position |
| D | Other navigation errors, including equipment failure notified to ATC in time for action |
| E | Other navigation errors, including equipment failure notified to ATC too late for action |
| F | Other navigation errors, including equipment failure of which notification was not received by ATC |
| G | Mode select error |
| H | Weather deviation (other than approved) |
| I | Other (please specify): |

# LETTER OF AGREEMENT

# Between

# AAA AREA CONTROL CENTRE

# And

# BBB AREA CONTROL CENTRE

AAA Area Control Centre Letter No: ___

BBB Area Control Centre Letter No: ___

**Subject:** **Air Traffic Control Coordination Procedures between AAA and BBB Area Control Centres (ACCs).**

## 1 INTRODUCTION

1.1 The detailed procedures as specified in this Letter of Agreement shall be applicable to all aircraft operating between AAA and BBB Flight Information Regions (FIRs).

## 2 OBJECTIVE

2.1 This Letter of Agreement is to define Air Traffic Control (ATC) coordination procedures for aircraft operating between the AAA FIR and the BBB FIR to ensure a safe, orderly and expeditious flow of air traffic.

## 3 DATE OF IMPLEMENTATION

3.1 This Letter of Agreement supersedes the previous Letter of Agreement on ATC Coordination Procedures between AAA Area Control Centre and BBB Area Control Centre dated _____.

3.2 Implementation of this Letter of Agreement is effective 28th November 2002 at 0000UTC.

## 4 ATC CLEARANCE LIMIT

4.1 In all cases where coordination between AAA ACC and BBB ACC can be achieved before departure or prior to the transfer of control point after airborne, the clearance limit shall be the airport of destination.

4.2 Where coordination cannot be achieved due to failure of the ATS communications, the clearance limit shall be at the transfer of control point. When coordination can subsequently be achieved, a revision to the clearance limit is to be issued.

## 5 SEPARATION STANDARDS

5.1 Separation between RNAV-equipped aircraft with same Mach Number

5.1.1 A minimum longitudinal separation of ten (10) minutes or 50 nm shall be applied between approved RNAV-equipped aircraft with the same Mach Number, which must be maintained from the entry point to the exit point.

5.2 Longitudinal Separation on ATS Routes??????

5.2.1 The minimum longitudinal time separation for traffic operating along these routes shall be fifteen (15) minutes.

5.3 Separation of RNAV-equipped aircraft when the following is faster

5.3.1 When the following aircraft is faster, for each 600nm in distance between the entry and the exit points of the area where the Mach Number Technique is used, one (1) minute is to be added for each 0.01 difference in Mach Number between the two aircraft concerned. The "rule of thumb" is shown on the table below for guidance.

| DIFFERENCE IN MACH | DISTANCE TO FLY AND SEPARATION (IN MINUTES) REQUIRED AT ENTRY POINT | | | | |
|---|---|---|---|---|---|
| | 001-600 (NM) | 601-1200 (NM) | 1201-1800 (NM) | 1801-2400 (NM) | 2401-3000 (NM) |
| 0.01 | 11 | 12 | 13 | 14 | 15 |
| 0.02 | 12 | 14 | 16 | 18 | 20 |
| 0.03 | 13 | 16 | 19 | 22 | 25 |
| 0.04 | 14 | 18 | 22 | 26 | 30 |
| 0.05 | 15 | 20 | 25 | 30 | 35 |
| 0.06 | 16 | 22 | 28 | 34 | 40 |
| 0.07 | 17 | 24 | 31 | 38 | 45 |
| 0.08 | 18 | 26 | 34 | 42 | 50 |
| 0.09 | 19 | 28 | 37 | 46 | 55 |
| 0.10 | 20 | 30 | 40 | 50 | 60 |

5.4 Separation of RNAV-equipped aircraft when the preceding aircraft is faster

5.4.1 When the preceding aircraft is maintaining a greater Mach Number than the following aircraft, the following separation in the table below shall be applied.

| **Mach difference** | **Separation Minima (minutes)** |
|---|---|
| 0.02 | 9 minutes |
| 0.03 | 8 minutes |
| 0.04 | 7 minutes |
| 0.05 | 6 minutes |
| 0.06 or greater | 5 minutes |

The two aircraft shall be cleared to maintain their respective Mach Number from the entry to the exit points.

## 6 FLIGHT LEVEL ASSIGNMENTS

6.1 All appropriate flight levels shall be available subject to coordination.

## 7 TRANSFER OF CONTROL

7.1 Transfer of control points shall be as follows:

| **ATS Routes** | **Transfer of control points** |
|---|---|
| ???? | _____ (N 00000 E 0000) |
| ???? | _____ (N 00000 E 0000) |

7.2 The transfer of control information shall be transmitted in sufficient time to permit receipt by the relevant ACC normally not later than thirty (30) minutes prior to the time the flight is estimated to pass over the transfer of control point. The transfer message shall contain information in the following format:

(a) Aircraft identification and type;

(b) Departure point, routes and destination;

(c) Estimate over the transfer of control point;

(d) Flight level;

(e) True air speed or Mach Number; and

(f) SSR code.

7.3 Revision to the estimate at the transfer of control point shall be passed to the receiving ACC if the revised estimate time differs by three (3) minutes or more.

7.4 In the event that communication with the aircraft is not established within five (5) minutes after the estimated time over the transfer of control point, the receiving ACC shall notify the transferring ACC of this fact.

## 8 COMMUNICATIONS

8.1 Primary communications shall be ATS Direct Speech Circuit. This circuit must be continuously guarded. International Direct Dialing (IDD) and High Frequency Radio Telephony (HF/RTF) could also be used as alternative means of communications.

The IDD telephone numbers are as follows:

| | | | |
|---|---|---|---|
| AAA ACC | - | (000) 000 0000<br>(000) 000 0000 | Fax: (000) 000 0000 |
| BBB ACC | - | (00) 000 0000<br>(00) 000 0000 | Fax: (00) 000 0000 |

8.2 In the event of unserviceability of ATS Direct Speech Circuit, IDD and the HF /RTF, ATC coordination shall be carried out via the Aeronautical Fixed Telecommunication Network (AFTN) circuit and higher priority prefixes may be used at the discretion of the controller.

8.3 When the ATS Direct Speech Circuit resumes normal operations and an aircraft which is being transferred has not passed the transfer of control point, a previous transfer of control message which was sent via the AFTN shall be re-transmitted on the ATS Direct Speech Circuit for confirmation.

8.4 Each speech communication shall be prefixed by a term indicating the type of message to follow such as Request Flight Plan, Transfer, Position Report, Revision or Approval Request.

8.5 Coordinators from both ACCs shall exchange initials at the termination of every message.

8.6 Taped recordings of communications between AAA ACC and BBB ACC shall be kept for a period of thirty (30) days.

## 9 DEVIATIONS

9.1 Deviations from the procedures prescribed herein may be approved on an ad hoc basis after coordination between the Duty Watch Supervisor of AAA ACC and the Duty Watch Manager of BBB ACC.

## 10 AMENDMENTS

10.1 Amendments to this Letter of Agreement shall be made only with the concurrence of both Civil Aviation Authority of AAA and Civil Aviation Authority of BBB.

| | |
|---|---|
| **SIGNED BY** | **SIGNED BY** |
| **A N Other**<br>Chief<br>AAA Area Control Centre<br>For Director of _____<br>Republic of AAA | **Some One Else**<br>Chief<br>BBB Air Traffic Control Centre<br>For Director-General of Civil Aviation<br>Republic of BBB |
| Date: | Date: |

# Procedures for the Assessment of Aircraft Navigation Errors in Support of the Implementation of a Revised ATS Route Structure (50NM Route Spacing) in the EMARSSH Area

## 1. Introduction

1.1 This document provides guidance on the methodology to be adopted in the assessment of navigation errors associated with the implementation of a revised route structure, and a revised lateral separation minimum of 50NM, in the [*Name of Region*].

1.2 This document should be read in conjunction with the Letter of Agreement between States of the *[Name of Region]* area, entitled *"Letter of Agreement for the Monitoring of Aircraft Navigation Errors in the [Name of Region]"*.

## 2. Data Gathering Responsibility

2.1 The States responsible for the gathering and onwards forwarding of data relating to the monitoring letter of agreement, and the monitoring areas identified in paragraph 4, shall be [Name of States].

2.2 Data gathering requirements are detailed in paragraph 5.

## 3. Monitoring Authority

3.1 Until such time as a permanent monitoring authority is established by APANPIRG, the organisation responsible for the collation and reporting of navigation error data will be the [RMA to be decided].

## 4. Designated Monitoring Areas

4.1 In order to validate the monitoring requirements supporting the reduction in lateral separation to 50NM, it is necessary to assess the track keeping ability of aircraft operating on the route structure, whilst they have been using on-board RNAV navigation systems only, for a maximum period of time, relative to the route being flown.

4.2 It is also essential that observation of the navigation of the aircraft, using radar, occurs before the on-board navigation systems have been able to "up-date" using ground-based navigation aids, such as DME/DME, or VOR/VOR.

4.3 The area or route segments within which the required monitoring may be undertaken, are: [defined area / route segments]

4.4 Monitoring of aircraft within this area or on these route segments should be undertaken as soon as possible after the aircraft enters radar coverage.

4.5 It should be noted that navigation error reports relating to areas other than those stated above, should also be processed and reported on, in order to support data gathering for future reductions in lateral and longitudinal separation. Details on the processing of these reports are given at paragraph 7.

## 5. Collection and Forwarding of Data

5.1 Those States identified in Paragraph 2, are required, at the end of each month, to collect the following data:

a) recorded navigation errors at the required monitoring areas, by way of the "Navigation Error Investigation Form", as detailed in the Letter of Agreement on the Monitoring of Navigation Errors; and

b) total monthly movement statistics relating to air traffic passing the designated monitoring areas within the designated monitoring height band.

*Note: The recording of monthly traffic movement statistics in the monitoring areas should be auditable - in other words, some formal method of recording the movements - eg copies of flight progress strips or data from Flight Data Processing Systems - should be available for audit if required.*

5.2 After collection, the required data should be forwarded to the Monitoring Authority [RMA], for assessment, to arrive not later than 15 days from the end of the month within which the data was collected. This will allow time for the Navigation Error Investigation Forms relating to occurrences near the end of a month, to be processed and returned as detailed in that form.

5.3 In respect of paragraph 5.1.a), if there have been no error reports submitted, a "Nil Return" should be submitted to the monitoring authority.

## 6. Assessing of Navigation Errors

6.1 The monitoring requirements associated with the introduction of the reduced lateral separation minima of 50NM will be in accordance with the requirements for RNP 10 navigation performance, i.e. aircraft navigation performance shall be such that the standard deviation of lateral track errors shall be less than 8.7 km (4.7 NM).

6.2 The requirements will be met, if the number of navigation errors by approved flights, measured in the monitoring areas, divided by the total number of approved flights over those monitoring points, is less than the required parameters, over a period of time for RNP 10 navigation performance. (see Appendix B).

6.3 The assessments for each month should be recorded separately, and also cumulatively, on a month-to-month basis. If the assessment in any particular month exceeds the required parameter, a check should be made to ensure that the cumulative assessment does not also exceed the required parameter.

6.4 If a trend is identified, which indicates that the required parameter is being exceeded regularly, or the cumulative assessment indicates an upwards trend, the Monitoring Authority should notify, through the ICAO Bangkok Office, the APANPIRG ATS/AIS/SAR Sub-Group, which should then investigate the need for a review of the applicable procedures.

6.5 An example of an assessment schedule is shown at Appendix B.

## 7. Processing of Navigation Error Reports Relating to Areas Other Than Required Monitoring Areas

7.1 The Letter of Agreement on the Monitoring of Navigation Errors requires all participating States to notify all appropriate navigation errors to the monitoring authority. This data should be collated and assessed in the following manner.

7.2 If the navigation error report relates to aircraft tracking on RNAV routes, the error should be assessed and processed in accordance with paragraph 6 above.

7.3 If the report relates to aircraft tracking on other (ie non-RNAV) routes, the errors should be assessed, and recorded separately. This information should be assessed by the APANPIRG ATS/AIS/SAR Sub-group meeting, for appropriate action.

## 8. Reporting Procedures

8.1 The Monitoring Authority should prepare an assessment schedule (refer to Appendix B), and forward a copy of this schedule, at least every 6 months, to:

a) all signatory States to the Monitoring Letter of Agreement; and

b) The Chairman of the APANPIRG ATS/AIS/SAR Sub-Group, through the ICAO Bangkok Office.

8.2 In addition, a report should be prepared on those errors reported in accordance with paragraph 7.3 above.

## 9. Attachments

Attachment A - Assessment Schedule Process
Attachment B - Sample Assessment Schedule

## Attachment A

## Assessment Schedule Process For Designated Monitoring Areas

**STEP 1.**

States concerned carry out a total monthly traffic count for approved traffic at FL290 and above, within the area (defined coordinates) or segments of routes:

a) Point A and Point B of RNAV route LXXX
b) Point C and Point D or RNAV route MXXX

**STEP 2.**

States concerned collate all Navigation Error Investigation Forms.

**STEP 3.**

Not later than the 15th day of each month, send the statistics gathered in Steps 1 and 2, to the Monitoring Authority [RMA].

**STEP 4.**

The Monitoring Authority collates the information into an assessment schedule.

**STEP 5.**

Each 6 months, the assessment schedule is sent to:

a) all signatory States to the Monitoring Letter of Agreement; and

b) The Chairman of the APANPIRG ATS/AIS/SAR Sub-Group, through the ICAO Bangkok Office.

**STEP 6 (if required).**

If the trend in errors is increasing, notify, through the ICAO Bangkok Office, the APANPIRG ATS/AIS/SAR Sub-Group, for appropriate action.

## Attachment B

## Example of Navigation Error Assessment Schedule For Designated Monitoring Areas

**a. Example of Monthly Total - Single Area**

| Month/ 1997 | Total traffic at Point A / Point B | Errors Category 1 | Errors Category 2 | Error Ratio Category 1 | Error Ratio Category 2 |
|---|---|---|---|---|---|
| April | 3105 | 1 | 0 | $3.22 \times 10^{-4}$ | 0 |
| May | 3042 | 2 | 0 | $6.57 \times 10^{-4}$ | 0 |
| June | 2810 | 0 | 0 | 0 | 0 |
| July | 2995 | 1 | 1 | $3.34 \times 10^{-4}$ | $3.34 \times 10^{-4}$ |
| | | | | | |
| | | | | | |
| | | | | | |

Category 1 = >30NM Category 2 = 50 - 70 NM

**b. Example of Cumulative Monthly Total - Single Area**

| Month/ 1997 | Total traffic at Point A / Point B | Errors Category 1 | Errors Category 2 | Error Ratio Category 1 | Error Ratio Category 2 |
|---|---|---|---|---|---|
| April | 3105 | 1 | 0 | $3.22 \times 10^{-4}$ | 0 |
| May | 6147 | 3 | 0 | $4.88 \times 10^{-4}$ | 0 |
| June | 8957 | 3 | 0 | $3.35 \times 10^{-4}$ | 0 |
| July | 11952 | 4 | 1 | $3.45 \times 10^{-4}$ | $8.36 \times 10^{-5}$ |
| | | | | | |
| | | | | | |
| | | | | | |

Category 1 = >30NM Category 2 = 50 - 70 NM

**c. Example of Monthly Total - All Four Areas**

| Month/ 1997 | Total traffic All Areas | Errors Category 1 | Errors Category 2 | Error Ratio Category 1 | Error Ratio Category 2 |
|---|---|---|---|---|---|
| April | 7852 | 2 | 0 | $2.55 \times 10^{-4}$ | 0 |
| May | 8311 | 2 | 0 | $2.41 \times 10^{-4}$ | 0 |
| June | 8263 | 1 | 0 | $1.21 \times 10^{-4}$ | 0 |
| July | 7678 | 1 | 1 | $1.30 \times 10^{-4}$ | $1.30 \times 10^{-4}$ |
| | | | | | |
| | | | | | |
| | | | | | |

Category 1 = >30NM Category 2 = 50 - 70 NM

**d. Example of Cumulative Monthly Total - All Four Areas**

| Month/ 1997 | Total traffic All Areas | Errors Category 1 | Errors Category 2 | Error Ratio Category 1 | Error Ratio Category 2 |
|---|---|---|---|---|---|
| April | 7852 | 2 | 0 | $2.55 \times 10^{-4}$ | 0 |
| May | 16163 | 4 | 0 | $2.47 \times 10^{-4}$ | 0 |
| June | 24426 | 5 | 0 | $2.05 \times 10^{-4}$ | 0 |
| July | 32104 | 6 | 1 | $1.87 \times 10^{-4}$ | $3.11 \times 10^{-5}$ |
| | | | | | |
| | | | | | |
| | | | | | |

Category 1 = >30NM Category 2 = 50 - 70 NM

**STATUS OF WGS-84 IMPLEMENTATION & UNIFORM FORMATTING IN THE MID REGION**

| State | Implemented | Planned | Date Implemented or Expected | Reported Uniform Formatting | Comments |
|---|---|---|---|---|---|
| Afghanistan | | | | | No information available due to inability to contact authorities in Kabul |
| Bahrain | Yes | | 19 Jun 1997 | Yes | |
| Egypt | Yes | | 28 Jan 1999 | Yes | |
| Iran | Yes | | 24 Feb 2000 | Yes | |
| Iraq | No | Yes | Mid 2000 | No | |
| Israel | No | Yes | 4th Q 2001 | No | |
| Jordan | Yes | | 1 Jan 1998 | Yes | |
| Kuwait | Yes | | 1 Jan 1998 | Yes | |
| Lebanon | Yes | | 1 Jan 1999 | Yes | |
| Oman | Yes | | Jan 2000 | Yes | |
| Qatar | Yes | | Jan 1997 | No | Data included in Bahrain AIP. |
| Saudi Arabia | No | Yes | 4th Q 2001 | No | En-route and international airports complete, domestic airport surveys 60% completed. |
| Syria | Yes | | 1 Aug 2001 | No | |
| U.A.E | Yes | | Nov 1994 | Yes | |
| Yemen | No | Yes | 4th Q 2001 | No | Main airports/en-route completed. Domestic airports being surveyed. |

-END -

# CONCLUSIONS/DECISIONS FROM THE MID RNP/RNAV TF/5 MEETING

**Conclusion 5/3: Interregional Cooperation**

That the MID Region States organize regular interface meetings with the EUR and Asia/PAC Regions with a view to harmonize procedures and implementation time-frames.

**Conclusion 5/4: Airworthiness and Operational Approval for RNP 5 and RNP10 Operations in the MID Region**

That with a view to facilitate and harmonize the airworthiness and operational approvals procedures for RNP 5 and RNP 10 operations in the MID Region:

a) the European Joint Airworthiness Authority (JAA) Temporary guidance Leaflet No.2, guidance material on airworthiness approval and operational criteria for the use of navigation systems in the European airspace designated for Basic RNAV operations be endorsed as the official guidance material for airworthiness and operational approvals for RNP 5 operations in the MID Region*;*

b) the guidance material developed by the United States, Federal Aviation Administration (FAA) Order No.8400.12 be used by States for the development of RNP 10 operational approval process.

**Conclusion 5/5: Implementation of GNSS in the MID Region**

That recognizing that the use of GNSS will significantly facilitate RNP implementation in the MID Region:

a) States use JAA Guidance Material on Airworthiness and Operational Criteria for use of navigation systems in European airspace designated for basic RNAV (RNP 5) operations;

b) States use the FAA Order 8400.12 for the granting of RNP 10 operational approvals;

c) States issue an AIC on the use of GNSS as a supplementary means of navigation with effect from 01 January 2002;

d) Operational approval of GNSS as a primary/supplemental means of navigation be expedited within the framework of the GNSS Task Force.

**Conclusion 5/6: RNAV/ RNP implementation strategy for the MID Region**

That the Phase 2 implementation strategy for the RNAV/RNP implementation in the MID Region be as follows:

a) The MID Region will establish RNAV/RNP areas instead of RNP/RNAV routes with a view to make maximum flexible use of the airspace;

b) The lower limit of the RNAV/RNP areas will be progressively reduced from FL285 to FL195, where feasible, taking into account VHF coverage capability and its incidence on the agreed target level of safety;

c) Unidirectional routes will be established in lieu of the present bi-directional routing network with a view to introduce parallel/flexible routes in an RNP 5 environment and thus paving the way for the safe introduction of RVSM in November 2003;

d) The use of GNSS as a primary/supplemental means of navigation will be introduced as soon as possible, in an evolutionary manner, in accordance with the MID Region GNSS implementation strategy, and preferably by January 2002;

e) The tentative date for the implementation of the RNAV/RNP areas is 28 November 2002 *(one year prior to the implementation of RVSM).*

- END -

## EMARSSH ROUTE TABLE

| EMARSSH ROUTE | EMARSSH TF/2 DESCRIPTION | REVISED DESCRIPTION | REMARKS |
|---|---|---|---|
| BB1 | SIN – MABIX – R461 – Colombo – TVM – AS1 | No change | • To add segment KUL to MABIX<br>• Delete R461 from MABIX to CMB |
| BB2 | MDN – 0434N 9400E – MDI – CLC – AS2 – 2016N 06033E | SALAX – 0434N 9400E – MDI – CLC – AS2 – 2037N 06057E | • Delete A330 |
| BB3 | SIN – MDN – BBG – AS3 | No Change | |
| BB4 | PUGER – MDN – ANSAX – MMV – B466 – BBI – B457 – BBM – AS4 | PUGER – ANSAX – MMV – B466 – BBI – B457 – BBM – AS4 | • SALAX direct to ANSAX was considered but traffic management by ATC in KL would be complicated. PUGER dct ANSAX was accepted by the Group.<br>• Delete B466 |
| BB5 | PUT – CMB | No change | • Delete R203<br>• Retain A327 for flights bound for Deigo Garcia. |
| BB6 | GUNIP – 0700N 09630E – Mumbai | GUNIP – 0546.2N 09800E – SAMAK - Mumbai | • SAMAK is on BB5 |

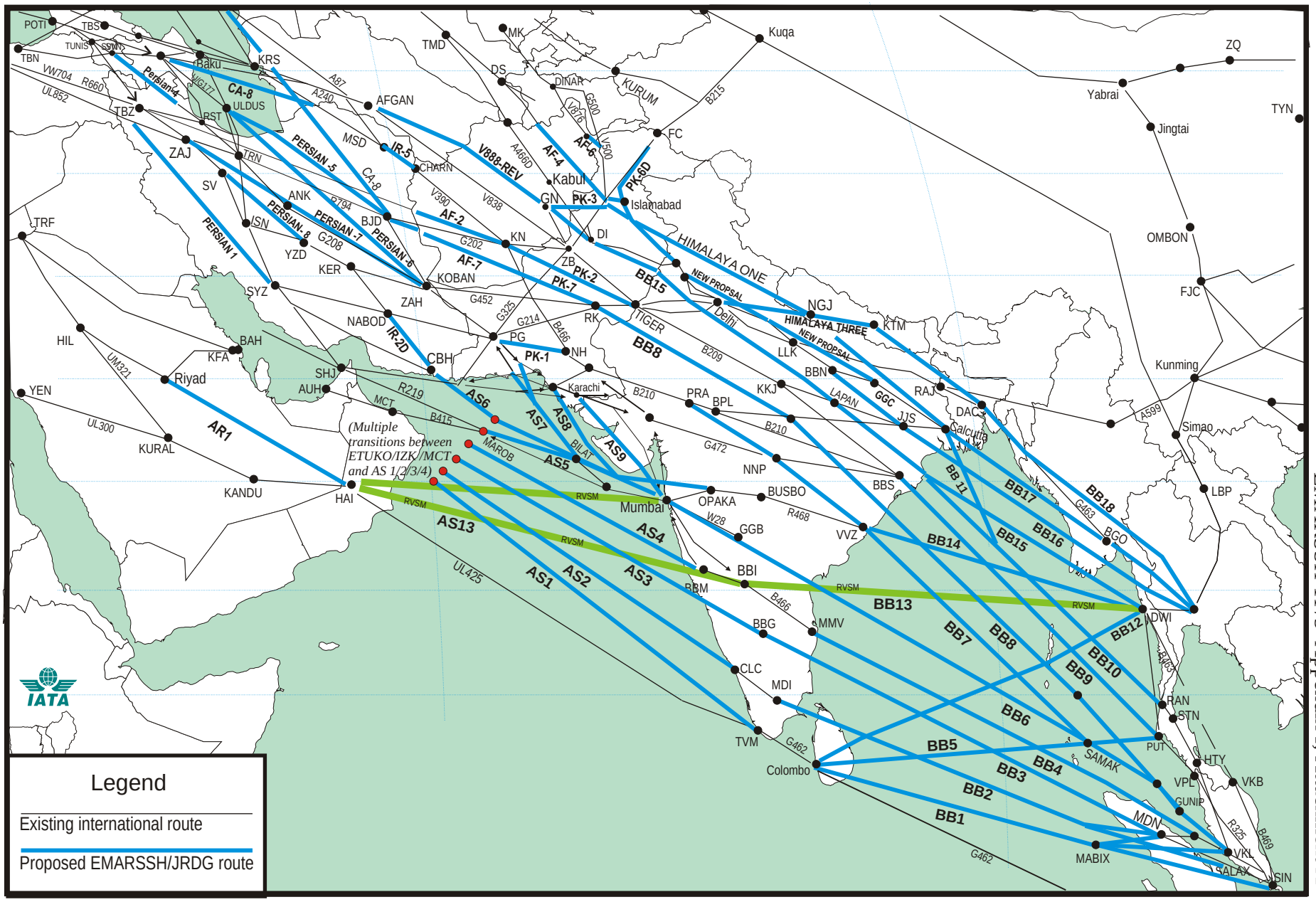
| EMARSSH ROUTE | EMARSSH TF/2 DESCRIPTION | REVISED DESCRIPTION | REMARKS |
|---|---|---|---|
| BB7 | 0700N 09630E – VV – NNP | SAMAK – VVZ – NNP – PRA | • Adjust and extend BB7 to intercept BB6 on BB5. |
| BB8 | VPL - 0700N 09630E – JB - RK | VPL 0700N9800E 10N 9415E – JB – RK | • between 1430 to 2330 UTC: VPG – 0700N 09800E |
| BB9 | PUT – BBS | No Change | • Delete UM501 |
| BB10 | RAN – 2045N 08718E – 2550N 08040E OSRAM | RAN – KAKID – LAPAN - PEKIX | • For flights joining BB10 from Kuala Lumpur and Singapore (eg) Thailand has agreed to consider converting W17 into an international route. |
| BB11 | RAN – CEA | 1800N 09020E - CCU | • Replaces an existing ATS routes from Calcutta which intersects BB10 at 1800N 09020E |
| BB12 | DAWEI – CMB | No Change | • nil |
| BB13 | DAWEI – BELARI – HAIMA | No Change | • To be implemented before RVSM, with other EMARSSH routes<br>• Flights to be restricted to FL260 or below and FL390 or above<br>• Myanmar to be consulted |
| BB14 | DAWEI – VVZ | No Change | • Delete R468 |
| BB15 | DAWEI – 2045N 08718E – BB10 | DAWEI – KAKID - BB10 | • nil |
| BB16 | BBK – G463 – BETNO – JJS – BBN – LLK | BBK – G463 – BETNO – JJS – BBN – LLK | • nil |

| EMARSSH ROUTE | EMARSSH TF/2 DESCRIPTION | REVISED DESCRIPTION | REMARKS |
|---|---|---|---|
| | – R460W – Delhi | – R460W – JAL – ASARI - Delhi | • |
| BB17 | BKK – A1 – CEA – NGJ | BKK – A1 – CEA – R460 GGC – JAL – BB16 | • Delete A1<br>• G463 to stay |
| BB18 | No change | No change | • nil |
| AS1 | TVM – 2020N 06038E | 2003N 06018E – TVM - BB1 | • New boundary point Muscat Mumbai FIR. |
| AS2 | CLC – 2020N 06038E | 2037N 06057E – CLC - BB2 | • New boundary point Muscat Mumbai FIR. |
| AS3 | BBG – 2100N 06126E | 211230N 0613830E - 1730N 06850E -BBG - BB3 | • New boundary point Muscat Mumbai FIR. India will co-ordinate with military authorities route over / around VA(D) 17 |
| AS4 | BBM – 2140N 06214E | 215030N 0622230E - BISET - [B452] - BBM - BB4 | • New boundary point Muscat Mumbai FIR. |
| AS5 | MAROB – CBH | 222630N 06307E [MAROB] - SUGID - | • MAROB position moved, continuation from SUGID to be decided. |
| AS6 | BILAT – CBH | CBH - SIDKA - 220330N 06352E - SUMOS 2000N 07040E- OPAKA - [R468] - BUSBO - VVZ - BB14 | • New boundary point Muscat Mumbai FIR. Co-ordination with Pakistan |

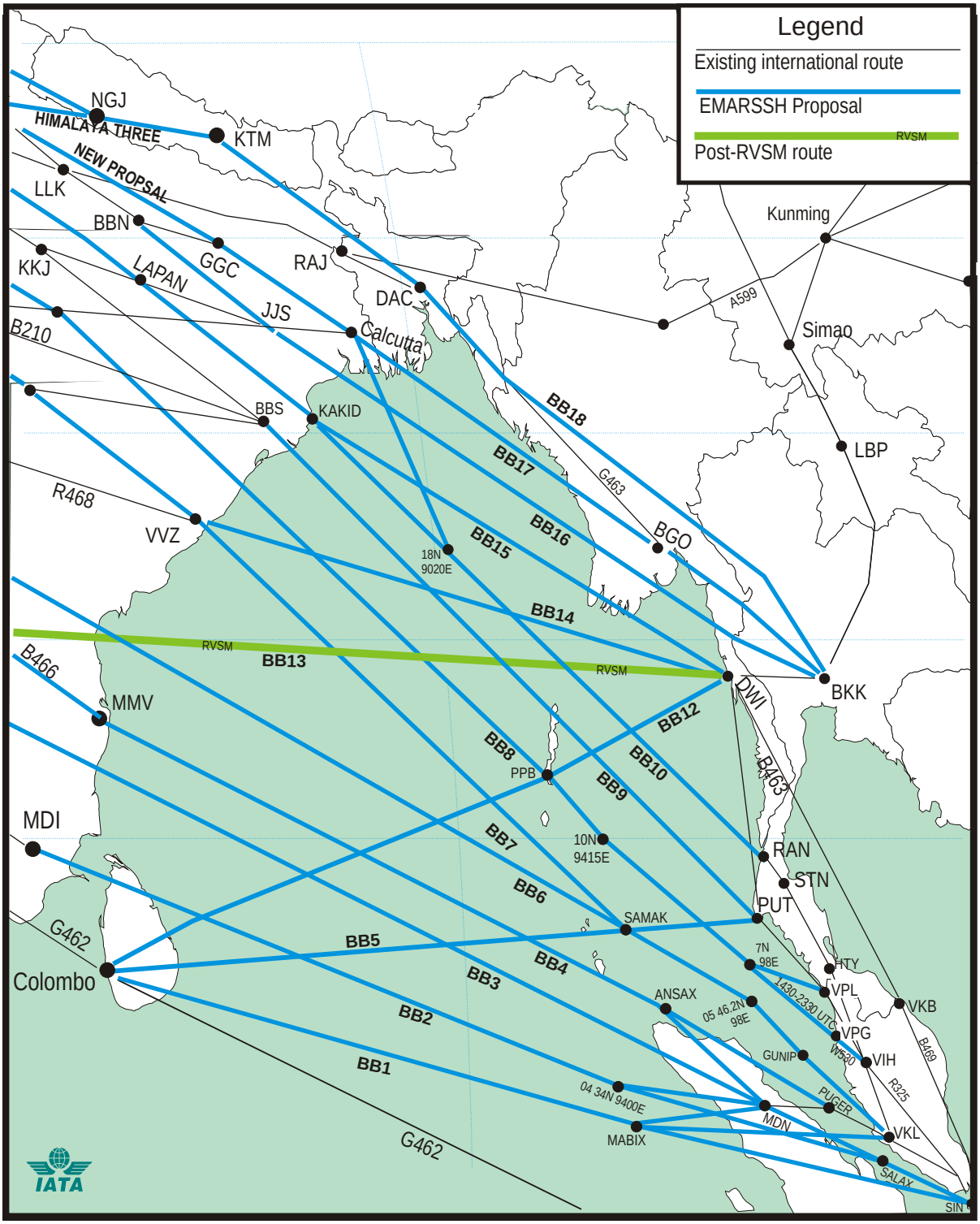
| EMARSSH ROUTE | EMARSSH TF/2 DESCRIPTION | REVISED DESCRIPTION | REMARKS |
|---|---|---|---|
| AS7N | BILAT – PG | PG - PARET - 2400N 06600E - BILAT - SUMOS | • One way airway shown PARET - PG. To be coordinated Pakistan. |
| AS7S | BILAT – PG | PG - DOSTI - 2400N 06600E - BILAT - SUMOS | • One way airway shown PARET - PG. To be coordinated Pakistan. |
| AS8 | SAPNA – 2210N 06830E – 1950N 07100E | SAPNA – 2210N 06830E – 1950N 07100E 2000N 07040E - AS6 | • Position 2000N 07040E inc. on R219/AS6 |
| AS9 | Mumbai – XXN XXXE - SAPNA | Already implemented as B342 | • Available 1230Z- 0030Z |
| AS10 | HAI - Mumbai | HAI - Mumbai | • IATA to provide statistical data. Will not be implemented prior RVSM Nov 2003 |
| AS11 | 2020N 06038E - ETUKO | To be decided Oman | • Transition in Oman FIR |
| AS12 | 2020N 06038E – Abeam IZK - AUH | To be decided Oman | • Transition in Oman FIR |
| AS13 | BBI – HAI | HAI - BBI - BB13 | • IATA to provide statistical data. Will not be implemented prior RVSM Nov 2003 |
| AS14 | 2100N 06126E – ETUKO | To be decided Oman | • Transition in Oman FIR |
| AS15 | 2140N 06214E – ETUKO | To be decided Oman | • Transition in Oman FIR |
| AS16 | 2100N 06126E – IZK | To be decided Oman | • Transition in Oman FIR |
| AS17 | SUR - 2020N 06038E | To be decided Oman | • Transition in Oman FIR |

| EMARSSH ROUTE | EMARSSH TF/2 DESCRIPTION | REVISED DESCRIPTION | REMARKS |
|---|---|---|---|
| AS18 | 2100N 06126E – SUR | To be decided Oman | • Transition in Oman FIR |
| AS19 | 2140N 06214E – IZK | To be decided Oman | • Transition in Oman FIR |
| AS20 | 2140N 06214E – MCT | To be decided Oman | • Transition in Oman FIR |
| AS21 | 2140N 06214E – PAPAR | To be decided between Oman and Iran. Co-ordinates to be changed per AS4 215030N 0622230E | • This route segment links AS4 with the Iranian PERSIAN 1 and Oman will consider providing additional transitions from AS-2 and AS-3 to join with AS21 if there is a formal request from IATA. |
| ADD PERSIAN 1-9 ROUTES | | | • |

---


POTI
TBS
TUNIS
SYMS
TBN
VW704
R660
UL852
Persian-4
UG177
Baku
KRS
CA-8
ULDUS
RST
TBZ
A87
A240
AFGAN
ZAJ
TRN
SV
MSD
IR-5
CHARN
PERSIAN -5
CA-8
ANK
R794
ISN
PERSIAN -8
PERSIAN -7
PERSIAN -6
PERSIAN 1
BJD
G208
YZD
KER
TRF
SYZ
KOBAN
G202
AF-2
AF-7
V888-REV
A466D
V390
V838
TMD
MK
DS
DINAR
G500
V816
V500
AF-4
AF-6
KURUM
B215
FC
Kabul
GN
PK-3
PK-6D
Islamabad
KN
DI
ZB
PK-2
PK-7
BB15
HIMALAYA ONE
NEW PROPSAL
Delhi
NGJ
HIMALAYA THREE
NEW PROPSAL
KTM
LLK
BBN
RAJ
DAC
Calcutta
JJS
LAPAN
GGC
KKJ
PRA
BPL
B210
B209
G452
G325
G214
B466
RK
TIGER
BB8
PG
NH
PK-1
Karachi
ZAH
NABOD
IR-2D
CBH
SHJ
AUH
HIL
BAH
KFA
Riyad
UM321
YEN
UL300
KURAL
AR1
KANDU
HAI
R219
MCT
B415
MAROB
BILAT
AS6
AS7
AS8
AS5
AS9
(Multiple transitions between ETUKO/IZK/MCT and AS 1/2/3/4)
RVSM
AS13
AS4
AS1
AS2
AS3
UL425
Mumbai
OPAKA
BUSBO
NNP
BBS
G472
R468
W28
GGB
VVZ
BBI
BBM
B466
BBG
MMV
CLC
MDI
TVM
G462
Colombo
BB11
BB17
BB18
BB14
BB15
BB16
BB13
BB7
BB8
BB12
BB9
BB10
BB6
BB5
BB3
BB4
BB2
BB1
G463
BGO
DWI
RAN
STN
PUT
SAMAK
HTY
VPL
VKB
GUNP
MDN
MABIX
R325
B469
VKL
SALAX
SIN
Kuqa
ZQ
Yabrai
TYN
Jingtai
OMBON
FJC
Kunming
A599
Simao
LBP
IATA
Legend
Existing international route
Proposed EMARSSH/JRDG route

EMARSSH TF/5
Appendix I; Attachment B



| STATES POINT OF CONTACT | | |
|---|---|---|
| **STATE** | **NAME** | **CONTACT DETAILS** |
| AUSTRALIA | Ron Rigney | +61 7 3866 3228<br>ron.rigney@airservices.gov.au |
| INDIA | (TBA) | |
| INDONESIA | Nanang Swastya Taruf<br><br><br>Novaro Martodihardjo | cnsatm@ekilat.com<br>swastya@pacific.net.id<br>Fax: +62 21 350 6451<br>novaro95@indo.net.id<br>Fax: +62 21 550 6148 |
| IRAN, Islamic Republic of | A. Golmohammadi Daryakenari | Tel: +9821 452 5493<br>Fax: +9821 452 7194<br>ats_dg@iricao.org |
| MALAYSIA | Maniam Appadurai | accwmfc@tm.net.my |
| NEPAL | (TBA) | |
| OMAN | Saud Humaid Al Athubi | Tel: +9689321664<br>Fax: +968519939<br>saud@dgcam.com.om |
| SINGAPORE | Mervyn Fernando | +65 541 2457<br>mervyn_fernando@caas.gov.sg |
| SRI LANKA | Ranjith M. Silva | Tel: +941 635105 - 611572<br>Fax: +941 635105<br>rmsaasl@slt.lk |
| THAILAND | Aphinun Vannangkura | Tel: +662 285 9057<br>Fax: +662 285 9389 |
| ICAO (ASIA/PAC) | John Richardson | Tel: +662 537 8189<br>Fax: +662 537 8199<br>jrichardson@bangkok.icao.int<br>jricho@hotmail.com |
| ICAO (MID) | Dhiraj Ramdoyal | Tel: +2(02) 2674845 ext 104<br>Mobile: +2(010) 1079183<br>Fax: +2(02) 2674843<br>dramdoyal@cairo.icao.int |
| ICAO (EUR/NAT) | (TBA) | |
| IATA | David Behrens | Tel: +65 239 7267<br>Fax: +65 536 6267<br>behrensd@iata.org |

| | | |
|---|---|---|
| **Tel:** | **[STATE]** | **AIC** |
| **Fax:** | **Aeronautical Information** | |
| **AFTN:** | **Service** | **xx/02** |
| **File:** | | **DATE** |

# REVISED ATS ROUTE STRUCTURE ASIA TO MIDDLE EAST/EUROPE SOUTH OF THE HIMALAYAS (EMARSSH PROJECT)AND RELATED RNAV AND RNP ISSUES FOR ENROUTE AIRSPACE

## 1. INTRODUCTION

1.1 The Revised ATS Route Structure – Asia to Middle East/Europe, South of the Himalayas (EMARSSH) Project, is an initiative of participating States and international organizations, which has been recognized and endorsed by ICAO as a significant development in the interests of safety, efficiency and capacity enhancements.

1.2 The EMARSSH Project in cooperation with States, ICAO Regional Offices (Asia/Pacific, Middle East and Europe/North Atlantic) and IATA has developed plans for a revised ATS route structure that will take advantage of existing and on-going CNS/ATM technologies.

1.3 The target date for EMARSSH route implementation is 28 November 2002. Some States in Southeast Asia have completed an earlier and phased introduction of EMARSSH routes within their area of responsibility.

## 2. EMARSSH ROUTES – AREAS PROPOSED FOR IMPLEMENTATION

2.1 Planning for EMARSSH routes requires an end-to-end perspective to be applied. Taking into consideration the extent of the airspace associated with this project, covering three ICAO regions, each State concerned has appointed a “Point of Contact” to be responsible for EMARSSH coordination and liaison with the respective ICAO Regional Coordinator.

2.2 Route specifications for the proposed EMARSSH routes within the ***[State]*** FIR are currently being finalised, and will be published by AIP SUP.

## 3. REQUIRED NAVIGATION PERFORMANCE (RNP10)

3.1 RNP is defined as a statement of the navigation performance accuracy necessary for operation within a defined airspace and is based on a navigation performance accuracy value which is expected to be achieved at least 95% of the time by the population of aircraft operating within the airspace.

3.2 Aircraft flying RNP10 beyond NAVAID use limitations are usually equipped with at least two independent and serviceable Long Range Navigation Systems (LRNSs) comprising INS, IRS/FMS or GPS, of integrity such that the navigation systems do not provide misleading information with an unacceptable probability.

3.3 Aircraft with RNP10 operational approval must meet a cross-track keeping accuracy and along-track positioning accuracy no greater than +/- 10 NM for 95% of the total flight time in RNP10 airspace. The total system error (TSE) in each dimension includes positioning error, flight technical error (FTE), path definition error and display error.

3.4 RNP10 will be established on designated EMARSSH routes in order to provide:

a) improved utilisation of airspace through the application of reduced separation minima;

b) operational benefits achieved by fewer restrictions on cruise speeds; and

c) standardisation through the adoption of an ICAO endorsed navigation requirement.

3.5 Further information on RNP, including the approval process, is contained within ICAO Document 9613-AN/937, Manual On Required Navigation Performance (RNP). Additional information can be found in ICAO Annex 11 and Regional Supplementary Procedures (Doc. 7030).

3.6 If States do not have an operational approval program for RNP-10 they should consider adopting the U.S. FAA Order 8400.12A for the granting of RNP10 operational approvals. A copy of this Document plus other useful information can be found on the FAA website, http://www.faa.gov/ats/ato/rnp.htm

## 4. RNP10 AND RNAV OPERATIONS ON EMARSSH ROUTES.

4.1 Many EMARSSH routes will be allocated an RNAV route designator, and carry an RNP10 requirement.

## 5. NON RNP10 OPERATIONS WITHIN OCEANIC AIRSPACE

5.1 In airspace where conventional and RNP10 routes are established, appropriate restrictions may be applied to aircraft operating on conventional routes either in the vertical or horizontal dimensions.

## 6. IMPLEMENTATION PROCESS

6.1 Most of the EMARSSH Project will be introduced on 28 November 2002, through the application of a coordinated and harmonized process at State and inter-regional levels. Notwithstanding the above, as this project covers three ICAO regions, some sections of the proposed EMARSSH route structure may be implemented earlier than 28 November, 2002, following mutual agreement between States concerned. In this case normal AIS notification procedures regarding route changes will be promulgated.

6.2 Implementation strategies are currently being developed, and will include the establishment of a Regional Transition Coordination Team. Details of the implementation process will be notified separately.

## 7. CANCELLATION

## 8. DISTRIBUTION *(as required)*

- END -

# EMARSSH TASK LIST and SCHEDULE

| No | Task | Action by | Target Date (not later than) | Date Start | Date Finish | Coordinating Body | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | Produce Draft AIC on intention to introduce RNP10 airspace and new EMARSSH routes | ICAO APAC and MID | 15 Dec 2001 | | | ICAO Asia/Pac Office<br>ICAO MID Office | |
| 2 | Promulgate AIC on intention to introduce RNP10 airspace and new EMARSSH routes | States | 31 Dec 2001 | | | ICAO Asia/Pac Office<br>ICAO MID Office | |
| 3 | Investigate implementation of special EMARSSH page on ICAO web-site | ICAO APAC | 30 Dec 2001 | | | ICAO Asia/Pac Office | |
| 4 | Nomination of a Point of Contact in each State and a Regional Coordinator | Implementing States and ICAO | 14 Dec 2001 | | | ICAO Asia/Pac Office<br>ICAO MID Office | ICAO offices to coordinate activities in its own region |
| 5 | Prepare amendment to Regional Air Navigation Plans | ICAO | 1 Nov 2002 | | | ICAO Asia/Pac Office<br>ICAO MID Office | |
| 6 | Establishment of a Transition Coordination Team (TCT) | EMARSSH TF/6 | Feb 2002 | | | ICAO Asia/Pac Office<br>ICAO MID Office | |
| 7 | RNP10 approval procedures developed | Operators, Users and Implementing States | 31 Mar 2002 | | | ICAO Asia/Pac Office<br>ICAO MID Office<br>IATA | |
| 8 | Develop Transition plan | EMARSSH TF/7 | June 2002 | | | ICAO Asia/Pac Office | |
| 9 | Nav error monitoring – LOAs | Implementing States, ICAO | June 2002 | | | ICAO Asia/Pac Office<br>ICAO MID Office | |
| 10 | Develop Safety Case Analysis for EMARSSH RNP10 Tracks | States and Air Services Australia | Sept 2002 | | | | |
| 11 | Regional Monitoring Agency appointed | ICAO (Asia/Pacific Regional Office) | 2002 | | | ICAO Asia/Pac Office | |
| 12 | Arrange Seminar on Provisions of Procedural Separation | ICAO | mid 2002 | | | ICAO Asia/Pac Office | |
| 13 | Nav error monitoring procedures | Regional Monitoring Agency | 28 May 2002 | | | CMA | |

| No | Task | Action by | Target Date (not later than) | Date Start | Date Finish | Coordinating Body | Remarks |
|---|---|---|---|---|---|---|---|
| 14 | Implementation of Navigation Error Monitoring | Implementing States | 28 May 2002 | | | ICAO Asia/Pac Office<br>ICAO MID Office | |
| 15 | ATC Procedures | Implementing States | 28 May 2002 | | | ICAO Asia/Pac Office<br>ICAO MID Office | |
| 16 | ATC Letters of Agreement | Implementing States | 28 May 2002 | | | ICAO Asia/Pac Office<br>ICAO MID Office | |
| 17 | Completion of Safety Assessment | CMA, Safety Analyst, Implementing States and ICAO | Sept 2002 | | | ICAO Asia/Pac Office | CMA is to submit its assessment to ICAO APAC by 30 Jun 2002 |
| 18 | Prepare and publish AIP SUPPS (including maps/charts) providing full route specifications | Implementing States | Aug 2002 | | | ICAO Asia/Pac Office<br>ICAO MID Office | |
| 19 | Publish Transition NOTAM | Implementing States | 28 Oct 2002 | | | ICAO Asia/Pac Office | |
| 20 | Staff Training | Implementing States and Operators | 14 Nov 2002 | | | ICAO Asia/Pac Office<br>ICAO MID Office | |
| 21 | Go/no go decision | States/Users/ICAO | 3 Oct 2002 | | | | |
| 22 | Implementation of EMARSSH Routes | Implementing States | 28 Nov 2002 | | | ICAO Asia/Pac Office<br>ICAO MID Office | |
| 23 | Review of Implementation | ICAO/States | Jan 2003 | | | | |

- END -