



International Civil Aviation Organization

**Thirteenth Meeting of the APANPIRG
ATS/AIS/SAR Sub-Group (ATS/AIS/SAR/SG/13)**

Bangkok, Thailand, 23 – 27 June 2003

Agenda Item 3: Review and progress the tasks assigned to the ATS/AIS/SAR/SG by APANPIRG

**IMPLEMENTATION OF REDUCED VERTICAL SEPARATION MINIMUM (RVSM)
IN THE ASIA PACIFIC REGION**

(Presented by the Chairman of the ICAO RVSM Implementation Task Force)

SUMMARY

The Ninth Meeting of the Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/9) established the ICAO RVSM Implementation Task Force to implement the reduced vertical separation minimum (RVSM) within the Asia Pacific Region. This paper provides an update on the implementation of RVSM in the Asia Pacific Region since the ATS/AIS/SAR/SG/12 Meeting.

1. INTRODUCTION

1.1 APANPIRG/9 developed the following Conclusion and Decision relating to RVSM:

Conclusion 9/3 - Examine the possibility of including the Asia Region to the implementation schedule of RVSM in the Pacific Region

In view of the RAN/3 agreement for an RVSM implementation schedule for the Pacific Region, an examination of the capacity needs, fuel-saving benefits and height-keeping performance for routes in the Asia Region should be conducted. If warranted, an RVSM implementation schedule should be developed to include the Asia Region.

Decision 9/4 - Formation of an ICAO RVSM Implementation Task Force

That, an ICAO RVSM Implementation Task Force be established at the earliest opportunity to further the work that has been accomplished by the Pacific RVSM Task Force.

1.2 The Terms of Reference of the ICAO RVSM Implementation Task Force (RVSM/TF) were amended by APANPIRG/11 to read as follows:

- a) To develop strategic, benefit-driven implementation plans (based on cost benefit studies), in concert with airspace users, for RVSM operations within selected areas and airspace of the Asia Pacific Region, ensuring inter-regional harmonisation;
- b) To consider any amendment to RVSM guidance material that may be proposed by States and international organizations;
- c) To address any other matters as appropriate and relevant to the implementation of RVSM;
- d) To include participation from States and International Organizations that were considering or involved with the implementation of RVSM; and
- e) To report the progress of the implementation of RVSM to the ATS/AIS/SAR Sub-Group.

2. ICAO RVSM IMPLEMENTATION TASK FORCE

2.1 Ms. Leslie McCormick, Acting Deputy Manager, ATS International Staff, Federal Aviation Administration (FAA), United States, was elected as Chairperson of the Task Force and continued to guide its activities until January 2002. Mr. Sydney Maniam, Head (Standards), Civil Aviation Authority of Singapore took over as Chairman of the Task Force from February 2002.

2.2 Messrs Greg Hood, Operations Manager, Airservices Australia, Yusfandri Gona, Head (Performance and Flight Test Section), DGAC Indonesia and Nopadol Sangngurn, Vice-President, Business Development Bureau, AEROTHAI undertook the duties of Chairman of the ATC Operations, Aircraft Operations and Airworthiness and Safety and Airspace Monitoring Work Groups respectively.

2.3 The Task Force met five times since its activities were reported at the ATS/AIS/SAR/SG/12 Meeting as shown below:

Special Coordination Meeting: 29-31 July 2002, Manila, Philippines

RVSM TF/16: 23-25 September 2002, Bangkok, Thailand

RVSM JCM: 19-20 Oct 2002, Abu Dhabi, UAE

5th RVSM Seminar: 15-17 January 2003, Bangkok, Thailand

RVSM TF/17: 20-24 January 2003, Bangkok, Thailand

2.4 The Task Force meetings included a wide representation from States planning to implement RVSM, operators, international organizations and industry groups. In order to accomplish its work program, the Task Force has been divided into three Work Groups to focus on the following:

- a) Safety and Airspace Monitoring;
- b) ATC Operations; and
- c) Aircraft Operations and Airworthiness

3. WESTERN PACIFIC/ SOUTH CHINA SEA IMPLEMENTATION

3.1 RVSM was introduced in the Western Pacific/South China Sea area in two phases. In Phase I, RVSM was implemented on 21 February 2002 in the following airspace:

- a) Phnom Penh, Kuala Lumpur, Kota Kinabalu, Manila, Singapore, Bangkok and Ho Chi Minh FIRs; and
- b) on N892 (within the oceanic airspace of the Sanya AOR).

3.2 Under the second phase, RVSM was implemented on 31 October 2002 in the following airspace:

- a) Hong Kong, Bali, Jakarta, Ujung Pandang, Vientiane and Ha Noi FIRs; and
- b) in the rest of the oceanic airspace of the Sanya AOR.

Phase I Implementation – 21 February 2002

3.3 Cambodia, China, Malaysia, Philippines, Singapore, Thailand and Viet Nam implemented RVSM successfully on 21 February 2002. China initially implemented RVSM on N892 (within the oceanic airspace of the Sanya AOR). Viet Nam implemented RVSM in the Ho Chi Minh FIR. In order to allow operators that had not obtained RVSM approval to continue to operate in the area, the States involved agreed to apply RVSM from FL310 to FL410. The transition was smooth except for some minor non-compliance of flight planning requirements and the occasional misunderstanding of level assignment. By the end of the first week of RVSM operations, these issues were resolved by the States and airlines concerned. Due to its geographical location, Philippines assumed the role of transition airspace between the Pacific and the South China Sea areas.

3.4 IATA commented positively on the implementation and operations of RVSM in the Western Pacific/South China Sea. The additional levels had allowed airlines to operate at or closer to their optimum vertical profiles. This had translated to significant reduction in ground delays at major international airports. However, there were some concerns on the dissemination of aeronautical information and NOTAMs by individual States. In this regard, IATA emphasized the need for close co-ordination and harmonization of activities by States. To address the issue, charting companies involved in developing RVSM-related aeronautical information were invited to attend meetings of the Task Force.

3.5 IFALPA considered that the implementation of RVSM in the Western Pacific/South China Sea area had enhanced the efficiency of operations. IFALPA commended the Task Force and States involved for the successful introduction of RVSM. IFALPA urged that procedures be harmonized with adjacent regions in order to further enhance safety. In this context, a Joint Coordination Meeting with the Middle East Region was held in October 2002 to harmonize the RVSM plans for the two regions. A second Joint Coordination Meeting will be held in July 2003 to achieve seamless RVSM operations for traffic flows from Asia to Europe, through the Middle East.

3.6 IFATCA expressed positive views on the implementation of RVSM. Overall, the application of RVSM had improved the management of traffic in the Western Pacific/South China Sea area.

Phase II Implementation – 31 October 2002

3.7 Under the second phase implementation on 31 October 2002, the following operational issues were completed:

3.7.1 Cambodia extended RVSM operations from FL290 to FL410 and included R468 (PNH – SAPEN) in the operational plan.

3.7.2 China implemented RVSM in the rest of the Sanya AOR (except A202) from FL290 to FL410.

3.7.3 Hong Kong China implemented RVSM in the Hong Kong FIR from FL290 to FL410. RVSM was not implemented on A202.

3.7.4 Indonesia implemented RVSM on 34 routes (viz, 12 routes in Jakarta FIR and 24 routes in Ujung Pandang FIR) from FL350 to FL390.

3.7.5 Lao PDR implemented RVSM from FL290 to FL410 on routes B465, R474, A1, A202, B202, B329, B346, and B218.

3.7.6 Malaysia, Philippines, Singapore and Thailand expanded the application of RVSM in their respective FIRs from FL290 to FL410.

3.7.7 Viet Nam implemented RVSM from FL290 to FL410 in the Han Noi FIR and expanded the application of RVSM in the Ho Chin Minh FIR from FL290 to FL410.

Operator Readiness Assessment

3.8 The Task Force adopted a target of 90-percent operator approval for RVSM implementation. The readiness assessment was done by the Asia Pacific Approvals Registry and Monitoring Organization (APARMO), using traffic samples in the Western Pacific/South China Sea airspace for the period 15 November to 15 December 2001. State RVSM approvals reported to the North Atlantic Central Monitoring Agency and APARMO, as well as MASPS-compliant airframes identified by EUROCONTROL, were compared to the traffic sample. The percentage of operations conducted by RVSM-approved operators and aircraft in the Western Pacific/South China Sea area was 91 percent.

Safety Assessments

3.9 A pre-requisite for RVSM implementation was the monitoring of the overall system performance to ensure that the established target level of safety was met and maintained. In this context, States provided monthly reports on large height deviations to the APARMO. Details of operational errors were also provided to the airlines/operators of aircraft involved.

Publication of Documents

3.10 The States that implemented RVSM published their respective AIP Supplements to provide operators with information on the policies and procedures for RVSM operations, including corresponding contingency procedures. The AIP Supplements were published in October 2001 and July 2002 for Phase I and Phase II implementation respectively.

RVSM Website

3.11 The Task Force established the RVSM Website through the FAA at www.faa.gov/ats/ato/rvsm1.htm, to provide comprehensive information on the requirements for RVSM implementation and operations to States and operators.

4. REVIEW OF BAY OF BENGAL AND BEYOND IMPLEMENTATION

4.1 The Task Force agreed on a common definition for the airspace in which RVSM will be implemented on 27 November 2003. To this end, the Task Force adopted the definition “**Bay of Bengal and Beyond (within the ICAO Asia Region).**” The RVSM airspace will include the Bangkok, Kolkata, Chennai, Colombo, Delhi, Dhaka, Jakarta, Karachi, Katmandu, Kuala Lumpur, Lahore, Male, Mumbai and Yangon FIRs.

Operational Implementation Plan

4.2 The Task Force agreed that the operational plan for the implementation of RVSM in the Bay of Bengal and Beyond should be harmonized with the RVSM plan of the Middle East Region. The aim was to achieve seamless RVSM operations for traffic flows from Asia to Europe, through the Middle East. The Task Force also agreed to examine orographic flow, known as mountain wave activity and other meteorological effects, which may have an impact on the safe implementation of RVSM in the area.

4.3 The preliminary implementation plans of the States involved are as follows:

4.3.1 India proposed to implement RVSM from FL330 to FL410 in the Kolkata, Chennai, Delhi and Mumbai FIRs, to allow domestic traffic that were not RVSM-approved to continue to operate at FL310 and below. The Task Force recognized that the proposed band of RVSM levels would not be operationally viable to international flights operating from Asia to Europe. The Task Force requested India to review its implementation plan for RVSM to be applied from FL290 to FL410. In addition, priority in the assignment of levels should be considered for international traffic flows from Asia to Europe (especially from 1630 UTC to 0030 UTC daily).

4.3.2 Indonesia planned to extend the application of RVSM from FL290 to FL410 into the Bay of Bengal area. Indonesia would also expand the use of RVSM from FL290 to FL410 for traffic operating between Jakarta FIR and Australia. In addition, Indonesia would apply RVSM from FL310 to FL410 for flights between Singapore and Jakarta FIRs.

4.3.3 Malaysia would extend the application of RVSM from FL290 to FL410 in the Kuala Lumpur FIR into the Bay of Bengal area.

4.3.4 Pakistan would implement RVSM from FL290 to FL410 in the Karachi and Lahore FIRs.

4.3.5 Maldives would implement RVSM from FL290 to FL410 in the Male FIR.

4.3.6 Nepal would coordinate with India (in particular the band of usable RVSM levels) before finalizing the implementation plan.

4.3.7 Sri Lanka would implement RVSM from FL290 to FL410 in the Colombo FIR.

4.3.8 Thailand would extend the application of RVSM from FL290 to FL410 in the Bangkok FIR into the Bay of Bengal area.

4.3.9 Since Bangladesh and Myanmar were not represented, the Task Force requested ICAO to liaise with them and ascertain their plans for the implementation of RVSM.

4.4 The Task Force would finalize the RVSM operational plan for the Bay of Bengal and Beyond at the 19th ICAO RVSM Task Force Meeting in June 2003. Where necessary, States would establish transition areas and procedures to facilitate the transit of aircraft between the FIRs concerned. The preliminary operational plan for the implementation of RVSM in the Bay of Bengal and beyond is shown in the table below.

RVSM Implementation in Bay of Bengal and Beyond (within the ICAO Asia Region)

Flight Information Region/Area of Responsibility	Flight Levels	Flight Level Orientation Scheme (FLOS)	Exclusive Airspace * Note 1	Initial Implementation	Remarks
Bangkok (South China Sea)	290 - 410	Single Alternate	Yes	21 Feb 2002 (Phase 1)	G474 R468(BKK-BOKAK) R588(KAKET-SOPOL) R334 N891(BKK-XONAN)
Bangkok (Bay of Bengal and Beyond)	290 - 410	Single Alternate	Yes	27 Nov 2003 (Phase 2)	Domestic and International routes in the entire BKK FIR
Chennai	330 - 410	Single Alternate	Exclusive over Oceanic airspace and non-exclusive over territorial airspace	27 Nov 2003	P570 M300 N563 P762. FL290 - FL410 on L645 request prior coordination levels
Colombo	290 - 410	Single Alternate	Yes	27 Nov 2003	Levels to be reserved for crossing routes P762, L645 and A327
Delhi	330 - 410	Single Alternate	Exclusive over Oceanic airspace and non-exclusive over territorial airspace	27 Nov 2003	
Dhaka	TBD	Single Alternate	Yes	27 Nov 2003	To be coordinated by ICAO
Jakarta (South China Sea)	350 - 390 (phase 1)	Single Alternate	Yes	31 Oct 2002	Phase 1: N646, N752, L764, L895, L511, B592, G464, A464, A576, G462, A585, G220
Jakarta (South China Sea)	290 - 410 (phase 2)	Single Alternate	Yes	17 April 2003	Jakarta – Australia FL290 – FL410 and Jakarta – Singapore FL310 – FL410 on existing routes where RVSM is currently being applied.
Jakarta (South China Sea)	290 - 410 (phase 3)	Single Alternate	Yes	AIRAC Feb 2004	

Flight Information Region/Area of Responsibility	Flight Levels	Flight Level Orientation Scheme (FLOS)	Exclusive Airspace * Note 1	Initial Implementation	Remarks
Jakarta (Bay of Bengal)	310 - 410	Single Alternate	Yes	27 Nov 2003	EMARSSH routes and R461, B344, A585, A576, B335, G468, B466, A327, R469, A330
Karachi	290 - 410	Single Alternate	Yes	27 Nov 2003	Subject to coordination with adjacent FIRs. Implementation on a route specific basis. Transition issues (including Afghanistan) being examined.
Kathmandu	330 - 410	Single Alternate	Yes	27 Nov 2003	Subject to coordination with adjacent FIRs.
Kolkata	330 - 410	Single Alternate	Exclusive over Oceanic airspace and non-exclusive over territorial airspace	27 Nov 2003	L301 FL290 – FL410 (subject to prior coordination)
Kuala Lumpur (South China Sea)	290 - 410 (Phase 2)	Single Alternate/ Modified Single Alternate	Yes	31 Oct 2002	
Kuala Lumpur (Bay of Bengal)	290 - 410	Single Alternate	Yes	27 Nov 2003	Subject to coordination with adjacent FIRs.
Lahore	290 - 410	Single Alternate	Yes	27 Nov 2003	Subject to coordination with adjacent FIRs. Implementation on a route specific basis. Transition issues (including Afghanistan) being examined.
Male	290 - 410	Single Alternate	Yes	27 Nov 2003	
Mumbai	290 - 410	Single Alternate	Exclusive over Oceanic airspace and non-exclusive over territorial airspace	27 Nov 2003	Routes passing through Calcutta will be FL330 – FL410. A451, G450, B459, A474 FL290 – FL410 with level reservations
Singapore (South China Sea)	310-410	Modified Single Alternate *Note 2	Yes	21 Feb 2002	
Singapore (Phase 2)	290-410	Modified Single Alternate *Note 2	Yes	31 Oct 2002	Routes from Singapore to Jakarta FIR FL350 – FL390
Singapore (Phase 3)	290 - 410	Modified Single Alternate *Note 2	Yes	17 April 2003	Routes from Singapore to Jakarta FIRs will expand to FL310 – FL410
Yangon	TBD	TBD	TBD	27 November 2003	To be coordinated by ICAO

Note 1: ? “Exclusive” means non-RVSM approved aircraft may NOT flight plan into airspace where RVSM may be applied. Aircraft that have not received State RVSM approval may be cleared to operate in airspace where RVSM may be applied in accordance with policy and procedures established by the ATS Provider States provided that 2,000ft vertical separation is applied. Some States may choose to allow non-RVSM State aircraft to flight plan into RVSM airspace.

Note 2: ? “Single Alternate” indicates an assignment of levels that complies with the RVSM Table of Cruising Levels. “Modified Single Alternate” means the RVSM levels for the six major RNAV routes (L642, M771, N892, L625, N884 and M767) in the South China Sea Region i.e. FL320, FL340, FL360, FL380 and FL400. RVSM approved aircraft operating on routes that cross the six one-way tracks would be assigned the eastbound levels FL330, FL370 and FL410 or westbound levels FL310, FL350 and FL390 accordingly. Individual State AIPs describe the details.

Note 3: ? This Draft Operational Implementation Plan has been developed as an indication of States’ current implementation plans – elements of this plan are subject to review by States.

Operator Readiness Assessment

4.5 The Task Force adopted the guidelines and procedures in the Asia Pacific RVSM Programme for Operator and Aircraft Approval in the Bay of Bengal and Beyond airspace. The Task Force also adopted a target of 90-percent operator approval for the implementation of RVSM in the area. The readiness assessment would be done by the APARMO, using traffic samples in the Bay of Bengal and Beyond airspace. As at 31 January 2003, about 70% of operators had obtained RVSM approval. IATA advised that most international operators in the area would be RVSM-approved, prior to the implementation of RVSM in November 2003.

Safety Assessments

4.6 To facilitate the safety assessments for RVSM implementation, States would provide data on traffic movement in the area where RVSM would be applied (viz, the EMARSSH routes) for the period 15 December 2002 to 15 February 2003. This would enable the APARMO to assess the height-keeping performance of RVSM-approved aircraft. A second period would be defined by the APARMO at the 19th ICAO RVSM Task Force Meeting.

4.7 In addition, States would provide monthly reports on large height deviations to the APARMO. Details of operational errors would also be provided to the airlines/operators of aircraft involved.

Publication of Documents

4.8 The States involved in the implementation of RVSM in the Bay of Bengal and Beyond would publish the AIP Supplement in June 2003, to provide operators with information on the policies and procedures relating to RVSM operations.

Monitoring Agency for RVSM Operations in the Asia Region

4.9 The Task Force reviewed the progress of transfer of responsibility for RVSM monitoring between the AEROTHAI and the FAA Technical Center. The Task Force noted the engagement between the AEROTHAI and the FAA Technical Center in the area of airspace analysis and data collection process pertaining to RVSM, as well as arrangements for training of personnel from the AEROTHAI at the FAA Technical Center. Subject to the approval of APANPIRG, the

AEROTHAI would assume responsibility as the monitoring agency for RVSM operations in the Asia Region by October 2003.

5. STATUS OF RVSM IMPLEMENTATION IN ASIA PACIFIC REGION

5.1 An update on the status of RVSM implementation in the Asia Pacific Region is shown in the table below:

FIR/AOR	RVSM Implementation Date	Comments
Anchorage Arctic	24 Feb 2000	RVSM Transition Airspace only
Anchorage Continental	24 Feb 2000	RVSM Transition Airspace only
Anchorage Oceanic	24 Feb 2000	
Auckland Oceanic	24 Feb 2000	
Bali	31 Oct 2002	Phased implementation
Bangkok	21 Feb 2002	Phased implementation
Beijing		
Biak	Not applicable	Subject to Indonesia upper airspace consolidation
Brisbane	24 Feb 2000	Oceanic East of Australia 24 Feb 2000 - Remainder of FIR 1 Nov 2001
Kolkata	27 Nov 2003	
Chennai	27 Nov 2003	
Colombo	27 Nov 2003	
Delhi	27 Nov 2003	
Dhaka	27 Nov 2003	
Guangzhou		
Hanoi	31 Oct 2002	Phased Implementation
Ho Chi Minh	21 Feb 2002	Phased Implementation
Hong Kong	31 Oct 2002	
Honiara	24 Feb 2000	
Jakarta	31 Oct 2002	Phased Implementation
Karachi	27 Nov 2003	
Kathmandu	27 Nov 2003	
Kota Kinabalu	21 Feb 2002	
Kuala Lumpur	21 Feb 2002	Phased Implementation – Western part 27 November 2003
Kunming		

FIR/AOR	RVSM Implementation Date	Comments
Lahore	27 Nov 2003	
Lanzhou		
Male	27 Nov 2003	
Manila	21 Feb 2002	
Melbourne	1 Nov 2001	
Mumbai	27 Nov 2003	
Nadi	24 Feb 2000	
Naha	24 Feb 2000	Pacific Oceanic (non-exclusive RVSM airspace) Further phased implementation planned
Nauru	24 Feb 2000	
New Zealand (Domestic)	13 July 2000	Non-exclusive
Oakland Oceanic	24 Feb 2000	
Phnom Penh	21 Feb 2002	
Port Moresby	13 Apr 2000	
Pyongyang		
Sanya AOR	31 Oct 2002	N892 within the oceanic airspace of Sanya AOR on 21 February 2002
Shanghai		
Shenyang		
Singapore	21 Feb 2002	
Taegu	TBD	
Tahiti	24 Feb 2000	Non-exclusive RVSM airspace
Taibei	21 Feb 2002	
Tokyo	24 Feb 2000	Oceanic
Ujung Pandang	31 Oct 2002	Phased Implementation
Ulaan Baatar		
Urumqi		
Vientiane	31 Oct 2002	
Wuhan		
Yangon	27 Nov 2003	

6. FUTURE WORK

6.1 The future work of the Task Force with respect to the implementation of RVSM in the Asia Pacific Region is as follows:

RVSM/TF/18: 30 June – 1 July 2003, Bangkok, Thailand
(90-day and 1-year follow up review on Western Pacific/South China Sea focus)

RVSM/TF/19: 2 – 4 July 2003 Bangkok, Thailand
(Bay of Bengal and Beyond focus)

RVSM/TF/20: 5 days October 2003 location TBD
(Bay of Bengal and Beyond focus)

(Target Implementation Bay of Bengal and Beyond AIRAC date 27 November 2003)

RVSM/TF/21: 3 days February 2004 location TBD
(90-day follow up review on Bay of Bengal and Beyond focus)

RVSM/TF/22: 2 days November 2004 location TBD
(1-year follow up review on Bay of Bengal and Beyond focus)

7 ACTION BY THE MEETING

7.1 The meeting is invited to note the progress of implementation of RVSM in the Asia Pacific Region and make recommendations to facilitate the implementation process.

? END ?