INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE SECOND MEETING OF THE WESTERN PACIFIC/SOUTH CHINA SEA RVSM SCRUTINY WORKING GROUP (WPAC/SCS RSG/2)

BANGKOK, THAILAND, 12 TO 15 JUNE 2007

The views expressed in this Report should be taken as those of the WPAC/SCS RSG and not of the Organization.

Adopted by the WPAC/SCS RSG
and published by the ICAO Asia and Pacific Office

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PART I – HISTORY OF THE MEETING

1. Introduction

1.1 The Second Meeting of the Western Pacific/South China Sea RVSM Scrutiny Working Group (WPAC/SCS RSG/2) was held in Bangkok, Thailand from 12 to 15 June 2007 at the Kotaite Wing of the ICAO Asia and Pacific Office.

2. Attendance

2.1 The meeting was attended by 37 experts from China, Hong Kong China, Indonesia, Japan, Malaysia, Philippines, Singapore, Thailand, United States, Viet Nam, IATA, IFALPA and IFATCA. A list of participants is at **Appendix A** to this report.

3. Officers and Regional Office

3.1. Mr. David Maynard, Manager, Oceanic and Offshore Services for the United States Federal Aviation Administration chaired the meeting.

3.2. Mr. Andrew Tiede, Regional Officer ATM, was the Secretary for the meeting. He was assisted by Mr. Polawat Chootai, Regional Officer ATM.

4. Opening of the Meeting

4.1 During his opening remarks Mr. Tiede welcomed all delegates to the second meeting of the WPAC/SCS RSG on behalf of Mr. Lalit Shah the Regional Director of the ICAO Asia/Pacific Office. In noting the wide participation from States and international organisations, Mr. Tiede considered that this was testament to the importance and relevance of the safety matters under the jurisdiction of the task force. He highlighted the implementation of metric RVSM throughout the airspace of China, which was scheduled for 22 November 2007, drawing attention to the need to harmonise the WPAC/SCS FLOS arrangements with the FLOS adopted by China for their RVSM implementation. Mr. Tiede wished the meeting every success.

4.2 The Chairman, Mr. Maynard, welcomed the members of the WPAC/SCS RSG to the second meeting of the RVSM Scrutiny Group. The Chairman pointed to the success of the first meeting in January/February 2007 and voiced his optimism that this meeting would be even more successful than the first.

4.3 The Chairman noted that RASMAG/7 had met the previous week and had acknowledged the good work that has already been accomplished by the WPAC/SCS RSG. He indicated that because of this good work which was now becoming widely acknowledged, there is the possibility that the structure/operating methods adopted by the WPAC/SCS RSG could be used as a model by other ICAO regions that are being impacted by similar circumstances which lead to the establishment of the WPAC/SCS RSG.

4.4 The Chairman stated that the primary goal for this meeting was to reach agreement on the FLOS for the WPAC/SCS region and to continue the work of identifying causal factors and development of mitigation strategies in relation to the LHDs that are occurring. The Chairman noted the papers that had been submitted and thanked the author's for their advance work and preparation for the meeting. The Chairman also acknowledged the work of the Secretariat, Mr. Andrew Tiede, for his efforts in preparing for this meeting.

5. Language and Documentation

5.1. All discussions were conducted in English. Documentation was issued in English. A total of 8 Working Papers and 4 Information Papers were considered by the meeting. A list of the Working and Information Papers is at **Appendix B.**

PART II - REPORT ON THE WPAC/SCS RSG/1 MEETING

Agenda Item 1: Adoption of Agenda

1.1 The meeting reviewed the agenda proposed by the Secretariat and included additional items for future direction and arrangements. Accordingly, the following agenda was adopted for the meeting:

Agenda Item 1:	Adoption of Agenda
Agenda Item 2:	RMA update for WPAC/SCS area
Agenda Item 3:	Flight Level Orientation Scheme arrangements for WPAC/SCS area
Agenda Item 4:	Safety and Airspace Monitoring issues
Agenda Item 5:	Implementation Management Considerations
Agenda Item 6:	Future direction and arrangements
Agenda Item 7:	Update WPAC/SCS RSG Task List
Agenda Item 8:	Any other business
Agenda Item 9:	Date and venue of the WPAC/SCS RSG/3 Meeting

Agenda Item 2: RMA update for WPAC/SCS area

2.1 The Monitoring Agency for the Asia Region (MAAR) provided a comprehensive summary of airspace safety oversight for the post RVSM implementation in the Asia Region, focusing on the Western Pacific/South China Sea (WPAC/SCS) airspace in which RVSM was fully implemented on 31 October 2002. The internationally accepted collision risk methodology was applied by MAAR in assessing the safety of the implementation of RVSM in the WPAC/SCS airspace and the safety oversight analysis was conducted based on a one-month traffic sample data (TSD) collected in December 2006 and available monthly Large Height Deviation (LHD) reports between January 2006 and April 2007 submitted by the affected States in the WPAC/SCS region.

Summary of Traffic Movements in WPAC/SCS Airspace

2.2 Based on the one month December 2006 traffic sample data, average daily flight movements on routes in the WPAC/SCS region were summarized by MAAR as shown in **Appendix C**. MAAR reported that there could be some inconsistencies, due to accuracy of the submitted data. Also, flight movements at certain fixes on the parallel routes had been interpolated based on the submitted traffic sample data.

Safety Oversight for the RVSM implementation in WPAC/SCS Airspace

2.3 Table 1 below summarizes the results of the MAAR airspace safety oversight in terms of the technical, operational, and total risks for the RVSM implementation in the WPAC/SCS airspace.

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.42×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	5.67×10^{-9}	-	-
Total Risk	**6.09×10^{-9}**	**5.0×10^{-9}**	**Exceeds Overall TLS**

Table 1: Risk Estimates for the RVSM Implementation in WPAC/SCS Airspace

2.4 In addition, **Figure 1** below presents the trends of collision risk estimates for each month using the appropriate cumulative 12-months of LHD reports.

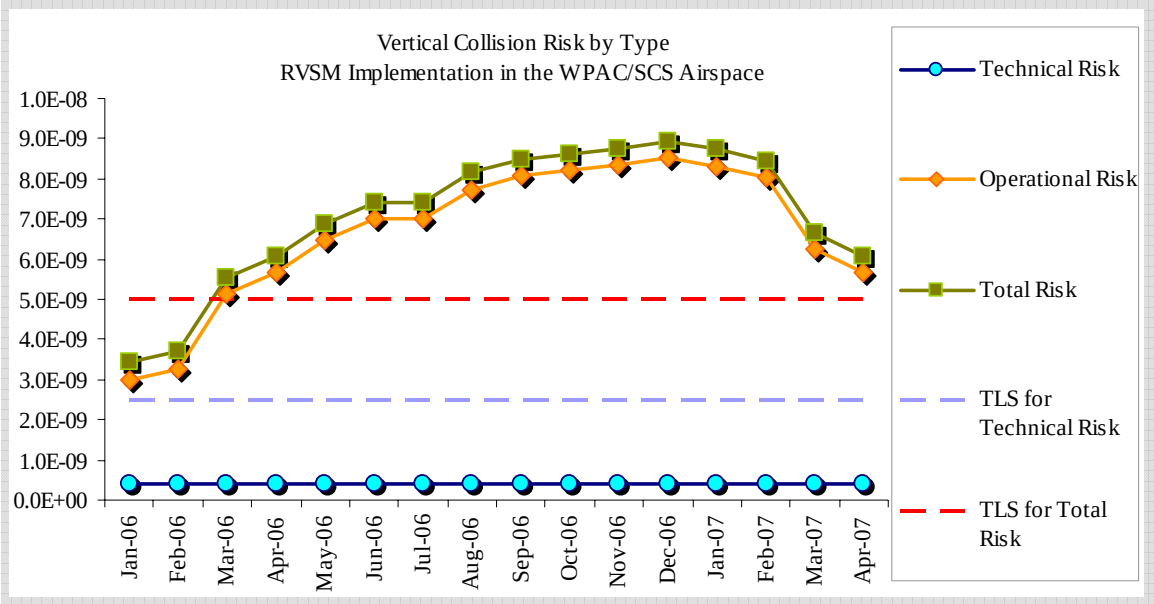

Figure 1: Trends of Risk Estimates for the RVSM Implementation in WPAC/SCS Airspace

2.5 Based on these collision risk estimates, the estimate of technical risks satisfies the agreed TLS values of no more than 2.5×10^{-9} fatal accidents per flight hour due to the loss of a correctly established vertical separation standard of 1,000 ft. However, the estimate of overall risks exceeds the agreed TLS values of 5.0×10^{-9} fatal accidents per flight hour due to all causes. The main cause contributable to this infringement is the significant number of operational errors, which are derived from the series of LHD occurrences.

2.6 The meeting reviewed the adverse trend that had been evident in terms of the WPAC/SCS safety assessment, recalling that previous RASMAG reports had recorded total risk estimates as follows:

RASMAG/3 (Jun 2005) = 4.90×10^{-9} (provisional, due lack of data)
RASMAG/4 (Oct 2005) = 3.46×10^{-9} (provisional, due lack of data)
RASMAG/5 (Jun 2006) = 7.08×10^{-9}
RASMAG/6 (Nov 2006) = 11.3×10^{-9}
RASMAG/7 (June 2007) = 6.09×10^{-9}

2.7 The most recent safety assessment from MAAR (as described above) placed the overall risk estimate at 6.09 x 10^{-9} fatal accidents per flight hour, reversing the adverse trend.

2.8 The meeting was pleased to note that although the TLS was still not being satisfied the latest safety assessment for the WPAC/SCS airspace had shown a dramatic reversal of the adverse trend. Recognizing that many LHD reports, including 'NIL' reports, for year 2007 had not yet been submitted (as discussed below) the meeting agreed that it was perhaps too early to conclude that this was a fully stable or improving trend, however it was a very pleasing result given the previous circumstances. The meeting was strongly of the opinion that remedial actions taken by States as a result of discussions during the WPAC/SCS RSG/1 meeting had contributed directly to the reversal of the negative trend.

Non Submission of Large Height Deviation (LHD) Data

2.9 MAAR reported that available data from a series of cumulative 12-months of LHD reports had been used in this safety assessment, for the period from January 2006 to April 2007. Table 2 (below) provides the summary of LHD reports submitted by the affected States in the WPAC/SCS Region.

State	Cambodia	China		Indonesia		Lao PDR	Malaysia		Philippines	Singapore	Thailand	Vietnam	
FIR	Phnom Penh	Sanya	Hong Kong	Jakarta	Ujung Pandang	Vientiane	Kota Kinabalu	Kuala Lumpur	Manila	Singapore	Bangkok	Hanoi	Ho Chi Minh
2006													
Jan	X	X	X	X	X		X	X	X	X	X	X	X
Feb	X	X	X	X	X		X	X	X	X	X	X	X
Mar	X	X	X	X	X		X	X	X	X	X	X	X
Apr	X	X	X	X	X		X	X	X	X	X	X	X
May	X	X	X	X	X		X	X	X	X	X	X	X
Jun	X	X	X	X	X		X	X	X	X	X	X	X
Jul	X	X	X	X	X		X	X	X	X	X	X	X
Aug	X	X	X	X	X				X	X	X	X	X
Sep	X	X	X	X	X				X	X	X		
Oct	X	X	X	X			X	X	X	X	X		
Nov	X	X	X	X			X	X	X	X	X		
Dec	X	X	X	X			X	X	X	X	X		
2007													
Jan	X		X	X			X	X	X	X	X		
Feb	X		X	X			X	X	X	X	X		
Mar	X		X	X			X	X	X	X	X		
Apr	X		X				X	X		X			

Table 2: Summary of LHD Reports Submitted by WPAC/SCS States since January 2006

2.10 In reviewing Table 2, the meeting expressed concern at the number of States that had not yet submitted LHD reports to MAAR for the period covered by the table, particularly the early part of 2007. Affected States present at the meeting reported that, in general, LHD statistics were being retained however it was evident that, in the sometimes complex internal reporting arrangements in some States, delays in transmitting this information to MAAR had occurred. States which had not yet provided LHD data undertook to conduct investigations into this matter, to make all outstanding data available to MAAR as soon as possible and to implement streamlined reporting processes to ensure that delays of this kind were overcome.

2.11 Indonesia and MAAR advised the meeting that LHD reports up until the end of May 2007 for the Jakarta and Ujung Padang FIRs had been submitted recently, but were received too late to be included in the data analysis for this meeting.

2.12 MAAR drew the attention of the meeting to the importance of both providing adequate data and ensuring accuracy in the submission of both LHD and Traffic Sample Data (TSD). Although the accuracy was slowly improving, MAAR still spent many hours trying to 'fill in the gaps' in data that had been submitted as the alternative was simply to discard the data as unusable. Despite their best efforts in following up with States, in a number of cases insufficient data had been forthcoming to complete a number of LHD reports, meaning that they had to be discarded from the sample. The lack of appropriate data meant that the safety assessments published by MAAR could not be considered fully accurate and, in the work done by MAAR for this meeting, it was likely that as a result of the missing LHD reports, the overall risk assessment was reporting a better situation than actually existed.

2.13 In order to overcome problems with the poor quality of some of the data provided, including incorrect format and/or incomplete data, MAAR requested that the States concerned strictly follow the instruction provided by MAAR for data collection. In this regard, MAAR encouraged States to visit the MAAR website at http://www.aerothai.co.th/maar for the most up to date information and particularly a traffic sample data template including instruction and illustration. Should there be any questions or comments, States were requested to contact MAAR at maar@aerothai.co.th. without hesitation.

2.14 The Secretariat also stressed the importance of providing LHD data reliably, accurately and quickly to Asia/Pacific RMAs on a monthly basis and in accordance with the data templates provided by the RMAs on their respective websites. The monthly data submission should include, very importantly, a monthly 'NIL' LHD statement if no LHDs had been reported.

2.15 As one way of ensuring that reports were submitted, a suggestion was made by the United States that MAAR send out a reminder to the States prior to the periodic update of the safety assessment being due. This is a practice that the PARMO uses based on feedback from one of their reporting States and PARMO had found this approach to be helpful. The meeting thought this was a good idea and MAAR agreed to do this for future reports.

2.16 The Secretariat informed the meeting that, recalling that problems in the submission of appropriate quantity and quality of data had been raised many times previously and had led to APANPIRG endorsing Conclusions 16/4 and 16/6, the RASMAG/7 meeting had drafted the following conclusion for consideration by APANPIRG/18 in September 2007:

Draft Conclusion RASMAG7/4

That, as a result of the non-provision of safety related traffic sample data to approved regional safety monitoring agencies as required by APANPIRG Conclusion 16/4, Bangladesh, Fiji, Lao PDR, Maldives, Myanmar, Nepal, Pakistan, Papua New Guinea, Sri Lanka and Tahiti be included in the APANPIRG List of Deficiencies in the ATM/AIS/SAR Fields in accordance with APANPIRG Conclusion 16/6.

Summary of LHD Occurrences in WPAC/SCS Airspace

2.17 Based on the received LHD reports shown in Table 2 above, the LHD occurrences between January 2006 and April 2007 in the WPAC/SCS region are summarized as follows.

2.18 Table 3 below summarizes the number of LHD occurrences and associated LHD duration (in minutes) by month in the WPAC/SCS RVSM airspace since January 2006.

Month-Year	No. of LHD Occurrences	LHD Duration (Min)
2006		
January	8	37.0
February	4	18.0
March	14	143.5
April	6	35.0
May	18	69.0
June	7	34.5
July	2	1.5
August	7	40.5
September	6	21.0
October	4	11.5
November	5	8.0
December	6	114.0
Total (2006)	**87**	**533.5**
2007		
January	7	25.0
February	2	2.0
March	4	81.0
April	3	3.0
Total (2007)	**16**	**111.0**

Table 3: Summary of LHD Occurrences and Duration in WPAC/SCS RVSM Airspace

2.19 Table 4 below summarizes the number of LHD occurrences and associated LHD duration (in minutes) by cause of the deviation, using the LHD Categorizations shown in **Appendix D**.

Cause of Deviation	No. of LHD Occurrences	LHD Duration (Min)
A	1	0.5
B	1	0.5
C		
D	1	3.0
E	5	128.0
F		

Cause of Deviation	No. of LHD Occurrences	LHD Duration (Min)
G		
H		
I	5	80.5
J		
K		
L		
M	77	416.0
N	1	0.0
O	12	16.0
Total	**103**	**644.5**

Table 4: Summary of LHD Causes in the WPAC/SCS RVSM Airspace

2.20 In light of the above, the LHD occurrences in the WPAC/SCS RVSM airspace are summarized as follow:

- Total of 103 LHD occurred in the WPAC/SCS RVSM airspace, accounting for 644.5 minutes of LHD duration between January 2006 and April 2007.

- Total of 5 LHD occurrences resulted from equipment failure (Category E), accounting for 128 minutes which are included in the calculation of technical risk.

- One LHD report in December 2006 resulting from ATC system loop error accounting for 72 minutes,

2.21 Based on the analysis, MAAR considered that the number of LHD occurrences and erroneous duration for aircraft operations was vital to the risk estimate. Therefore, MAAR strongly recommended that there are remedial and preventive actions put in place to persistently maintain number of LHD occurrence at minimum.

2.22 Although improvements were evident in relation to better performance against the TLS, based on the LHD summary MAAR highlighted that the number and duration of LHD occurrences for aircraft operations in the WPAC/SCS RVSM airspace were still very high. Therefore, MAAR strongly recommended that the Scrutiny Group investigate these occurrences and put in place the appropriate remedial actions on an urgent basis.

LHD reduction - State actions since last meeting

2.23 Each of the States present at the meeting provided a summary of the activities directed at reducing LHD occurrences that had taken place since the last meeting updated. The guidance provided by WPAC/SCS RSG/1 had been helpful in identifying areas of weakness in ATC to ATC coordination and many States had implemented changes in this regard. Investigations were regularly conducted into specific LHD occurrences and coordination completed with airlines which had been involved.

2.24 AIDC messaging had recently been implemented between Hong Kong ACC and Sanya ACC and this was expected to ensure a high degree of accuracy in the transfer coordination between these two centers. Singapore had instituted a greater use of ADS/CPDLC to mitigate difficulties with poor atmospheric conditions for HF communication. Phase 1 of the ADS/CPDLC trial in Ho Chi Minh FIR had been successful and Phase 2 would commence in August 2007, providing enhanced surveillance and communications in airspaces that were previously non-radar, HF communication areas. Many States had highlighted the issues with LHD to ATCO staff, and also with aircrew in some cases.

Analysis of LHD Reports

2.25 In order to facilitate the investigation of the LHD occurrences reported since WPAC/SCS RSG/1, MAAR provided limited details of each of the specific LHD occurrences reported by States over the period January 2007 to April 2007. The meeting conducted an extensive review of the summary LHD information provided by MAAR in relation to the 16 available LHD reports received from States for this period. The data analysis was supported by verbal feedback from State delegates, resulting in the following conclusions:

a) a large percentage of LHD occurrences (9 of the 16 reports) were directly related to erroneous ATC coordination between ACCs;

b) Three of the 16 reports were related to ATC system loop errors in which misunderstanding had occurred between ATC and flight crew as to the terms of the clearance issued;

c) one report was pilot related (level bust);

d) one report related to TCAS response; and

e) two reports relating to aircraft technical factors were further examined and found not to meet the criteria for LHD.

ATC Coordination issues

2.26 The meeting recognized that the high percentage of ATC coordination errors recorded at paragraph 2.25 a) above was consistent with the finding of the WPAC/SCS RSG/1 meeting. In noting that there were many ways in which ANSPs could address their obligations in relation to improving performance in this area, WPAC/SCS RSG/1 had considered that this was a primary function of ANSPs and the meeting urged affected ANSPs to continue to take urgent and effective action in this regard.

ATC system loop errors

2.27 In relation to the ATC system loop errors reported at paragraph 2.25 b) above, the meeting discussed issues in relation to poor HF communication conditions that had lead to differences in the ATC clearance information being held by ATC and flight crew respectively, readback/hearback errors and pilot habituation associated with the flight level routinely assigned for descent not being assigned on a particular occasion but the pilot acting habitually and descending to the ‘normal’ level. States reported appropriate actions in investigating and following up these examples insofar as possible; and

TCAS Report and Level Bust

2.28 The level bust reported at paragraph 2.25 c) and the TCAS report described at paragraph 2.25 d) above were not considered by the meeting to be systemic in nature and therefore did not lend themselves to a systemic solution. The meeting considered that as the random nature of these types of events was difficult to predict attempts to identify additional actions by the WPAC/SCS RSG would not be productive.

Erroneous reporting of LHD

2.29 In reviewing the LHD reports referred to in paragraph 2.25 e) above which were subsequently found not to meet LHD criteria, the meeting recalled discussions during WPAC/SCS RSG/1 as to what actually comprised a LHD. It was evident that different interpretations were held by different States and that this had resulted in LHD reports being submitted for some situations that, although they were occurrences resulting in flight level variance of 300 feet or more, were not actually LHD occurrences and therefore should not have been reported as such. The meeting was hopeful that the guidance material provided by RASMAG (paragraphs 4.4 to 4.9 refer) would assist States to avoid the erroneous reporting of LHD.

Japan – Measures to mitigate LHD on ATS route A590

2.30 Japan provided the meeting with details of the mitigating measures taken by Japan Civil Aviation Bureau (JCAB) to rectify the 4 LHD cases, as reported at WPAC/SCS RSG/1, caused by "Error in ATC-unit-ATC-unit transferred/transition message" for flights from Fukuoka ATMC to Manila ACC. The LHDs had which occurred on the airway A590 within the Fukuoka Air Traffic Management Center (ATMC) Oceanic Sector 5(ATMC/OS5) during December 2005 to January 2006.

2.31 The meeting was informed that Fukuoka Air Traffic Management Center Oceanic Sector 5 (ATMC/OS5) had control of a portion of airway A590 totaling 573nm in distance with 4 intersections between DOVAG and GURAG crossing airways G339, R583, R584 and R595. In accordance with the Operational LOA between Manila ACC and Fukuoka ATMC, it was possible for ATMC/OS5 to change altitude of aircraft without prior coordination even after transfer information was given to Manila ACC, providing that the aircraft was beyond 30 minutes from the common FIR boundary.

2.32 As a result of the information made available at WPAC/SCS RSG/1, Fukuoka ATMC scrutinized the 4 LHD cases and identified several potential causal factors, as follows:

a) Controllers had intended to notify flight level revisions after changing altitude, but had forgotten due to heavy workload;

b) Receiving unit (Manila ACC) was too busy to answer the phone while transferring unit became very busy with other traffic and failed to notify the revision;

c) Frequent technical unserviceability of the direct voice speech circuit;

d) Miscopying of the transferred level; and

e) Failure of transferring unit (ATMC) to check current altitude against the automatically indicated transfer information due to heavy workload.

2.33 As a result of the finding above, Fukuoka ATMC advised all the controllers to take following steps:

a) Once transfer information was forwarded to Manila ACC, controllers shall not issue clearance to change altitude until completing notification of revision to Manila ACC.

b) When clearance was issued for an emergency situation, controllers shall keep electronic strips highlighted until completing notification to Manila ACC.

c) As soon as TUNTO ATO was received, controllers shall check current situation, especially altitude, against the transfer information already given to Manila ACC.

2.34 The meeting considered that the process and outcomes outlined by Japan were a good example of the application of an ATS safety management system, showing how specific recommendations had been implemented as a result of an investigation of LHD related operational errors. An ATS SMS that enables detailed examination of operational errors to be undertaken in order to identify weaknesses is likely to be effective in reducing the likelihood of errors.

Fukuoka ATMC, Naha ACC, Manila ACC - Implementation of LHD MOU

2.35 Following the WPAC/SCS RSG/1 meeting, Japan and the Philippines had engaged in close coordination in order to reduce the numbers of LHD incidents being reported. As part of this work, a Memorandum of Understanding (MOU) in respect to Mutual Reporting of LHD Occurrences had been signed between the Chiefs of the ATMC at Fukuoka, Naha ACC and Manila ACC for implementation on 1st June 2007. The MOU (**Appendix E** refers) details procedures ensuring that when an LHD is observed or reported, the ACC Supervisor first becoming aware of the LHD should coordinate with the Supervisors of the other two Centres in order to ensure that they are aware of the LHD occurrence.

2.36 The meeting congratulated Japan and the Philippines on this initiative which recognized the intent of the discussions that had been held during WPAC/SCS RSG/1. The ability of all affected ACCs to be aware of the LHD would facilitate early investigation of the situation, enabling accelerated remediation and assisting greatly in reducing the numbers of LHDs. The meeting encourage other States to follow the model established by Japan and Philippines and join in similar formalized arrangements aimed at reducing the numbers of LHD occurrences.

Agenda Item 3: Flight Level Orientation Scheme arrangements for WPAC/SCS area

China - Implementation of 300 metre RVSM

3.1 The Asia/Pacific RVSM implementation Task Force had been re-convened in response to a request from China that the RVSM Task Force be made available to assist China with the metric RVSM implementation in the whole of the China airspace, with target date 22 November 2007. The Secretariat presented information to the meeting regarding the RVSM/TF/30 meeting (March 2007, Bangkok) and the Special Co-ordination Meeting for the RVSM Implementation by China (SCM/RVSM China, May 2007) convened to consider the planning and implementation process for the RVSM implementation for China. The Secretary reported that these meetings had considered a number of important issues related to the planned implementation by China, including the flight level allocation scheme, the use of 300 metre metric flight levels, training material and flight level transition procedures for the many adjacent FIRs.

3.2 Of particular interest to the Scrutiny Group was the FLOS that would be used for the China RVSM implementation, as shown at **Appendix F**. An understanding of how the current WPAC/SCS would interact with the China FLOS was necessary and any changes that were made in the WPAC/SCS arrangements would need to be compatible with the China FLOS.

3.3 China updated the meeting about the background development work that had gone into the China FLOS arrangements and summarized the current progress of China in working towards implementation in November 2007. The meeting noted that, in the simplest terms, the China FLOS was an ‘east odds- west evens’ 300 metre metric system that used a + 100 feet adjustment to each imperial RVSM flight level in the Table of Cruising levels promulgated by Annex 2, Appendix 3. For example, an

eastbound flight at S0890m would be at FL291. This FLOS configuration would require only a 100 foot transition between ICAO 1000 feet imperial RVSM and China 300 metre metric RVSM.

3.4 The meeting appreciated China's work in attempting to bring the China FLOS arrangements as close as possible to the standard ICAO imperial FLOS and noted that even with the required 100 feet transition into imperial flight levels, the adoption of 'east odds, west evens' by China would reduce complexity in transitioning to/from existing imperial 'east odds, west evens' RVSM FLOSs.

Singapore - Review of 'New Philippines" proposal from WPAC/SCS RSG/1

3.5 Singapore provided the meeting with an assessment on the impact on safety, efficiency and capacity of the 'New Philippines' FLOS that had been proposed during WPAC/SCS RSG/1. Singapore had conducted simulations using the proposed FLOS and the following outcomes were observed;

(a) Safety

Flights operating on the parallel and crossing routes had different flight levels allocation to ensure a 1,000 feet vertical separation especially at intersection points between these routes thereby enhancing flight safety. In the event of large scale weather deviations, vertical separation could be easily and quickly re-established as alternative flight levels were available. This had minimized human errors in the allocation of flight levels for the affected flights.

(b) Capacity

There was a reduction in airspace capacity. Delays were experienced for aircraft departing from Singapore and Malaysia to the Far East on ATS routes L625 and N884. Aircraft were delayed en-route to lose time to ensure longitudinal separation. There was also increased coordination workload between Singapore and Malaysia ACCs. As such, instead of the current 3 No PDC flight levels allocated for aircraft departing from Kuala Lumpur, there could be a reduction in the number of allocated No PDC flight levels.

(c) Efficiency

In the proposed 'New Philippines' FLOS, the aircraft operating on the 6 trunk routes were separated by either 1000ft or 3000ft. As such, there could be an impact on flights operating at or close to optimum flight levels as there could be the 3,000 feet altitude difference instead of the current 2,000 feet. Climbing or descending an aircraft due to weather avoidance was also more challenging in view the flight levels allocation on the parallel and crossing routes.

(d) Workload

Transition activities were still required for flights operating between Singapore and Kuala Lumpur FIRs in the proposed FLOS system. Controllers were required to be extra alert when climbing an aircraft to a requested higher flight level as the aircraft would have to climb 3,000 feet to the next flight level in the FLOS instead of the current 2,000 feet.

3.6 Singapore also presented the traffic data for May 2007 (**Appendix G** refers) for consideration by the meeting and stressed that Singapore would only support a change in the WPAC/SCS FLOS if safety, efficiency and capacity were at least comparable to the current FLOS situation.

Viet Nam - RVSM Operations within Hanoi and Ho Chi Minh FIRs

3.7 Vietnam provided the meeting with a brief overview of the implementation status of RVSM operations within Hanoi and Ho Chi Minh FIR since Phase 1 on 21st February 2002 and Phase 2 on 1st November 2002. Operational advantages resulting from these implementations include:

a) Greater number of flight levels available;

b) Most of the traffic operated at optimum levels;

c) Reduced delays;

d) Enhanced flight safety as well as reducing ATC coordination and workload;

e) Significant overall improvement in operations

3.8 However, in Viet Nam's experience, operational issues still existed, including the following:

a) Complexity of FLOS between single and modified alternative FLOS in the area;

b) Differences between FLOSs in the Western Pacific/Southeast area/Bay of Bengal;

c) A number of RVSM-CVSM transition areas in to some FIRs; and

d) Complexity of other issues such as large-scale weather deviations procedure activation, RVSM safety monitoring/assessment, etc.

Phase 3 – Harmonization of FLOS

3.9 Viet Nam considered that Phase 3 of the RVSM programme would be the harmonization of RVSM FLOS in the areas surrounding Viet Nam.

3.10 In this context, Viet Nam had been in close coordination with China for some time and intended that a change to single alternate FLOS would take place in the Hanoi FIR in November 2007 coincident with the China RVSM implementation in order to harmonize with the RVSM implementation within China airspace.

3.11 Viet Nam reported that the factors below were significant and would be considered in their Phase 3 RVSM implementation. Details of the proposed Phase 3 FLOSs and No-PDC FLs for specific ATS routes are contained in **Appendices H & I** of this report.

a) Single alternative FLOS on routes Class II, III, IV;

b) Suitable modified alternative FLOS on parallel routes Class I;

c) Adjustment of No-PDC FLs allocations for normal operation conditions and for large-scale weather deviation conditions;

d) The revised FLOS in the area should be simple, harmonized with the FLOS in adjacent areas and the number of usable FLs should be maximized;

e) Advantages of the current FLOS should remain (the modified FLOS for parallel RNAV routes in suitably revised manner);

f) Shortcomings raised from the current FLOS application should be eliminated; and

g) New RVSM/CVSM transition areas and current imperial system to metric system transition areas along one ATS route should be combined into a single smooth transition.

3.12 Viet Nam provided details of recent daily average traffic volumes on major ATS routes as shown below:

1)	Domestic and international route W1:	100 - 120 flights
2)	Route R474:	30 - 35 flights
3)	Route A202:	60 - 70 flights
4)	Routes A1/P901:	110 - 125 flights
5)	Routes L642 and M771:	60 - 70 flights (on each ATS route)
6)	Routes N892 and L625:	30 - 40 flights (on each ATS route)
7)	Routes G474 - L628:	20 - 30 flights

Philippines - Proposed FLOS for the Manila FIR

3.13 The Philippines informed the meeting that the current FLOS continued to create concerns on transition issues (L625 and N884), crossing tracks limitations, large scale weather deviations, human factor and LHD issues. The Philippines considered that the Scenario 2 FLOS created more flight level transition issues (N892, L625, N844 and M767), large scale weather deviation and human factor issues.

3.14 The Philippines presented the meeting with a proposed enhanced Scenario 2 FLOS applicable to the Manila FIR (**Appendix J** refers) based on the single alternate arrangement with reserved flight levels would address the safety issues. The Philippines also proposed an additional ATS route (LBG-CAB-YURIX) adjoining N884 that would serve Singapore/Malaysia-Japan flights and address the capacity concerns.

3.15 The meeting noted the comparative traffic volume on the parallel and crossing routes provided by the Philippines which indicated that N884 was underutilized and may serve the northeast flights. Times of occupancy of the crossing tracks were also examined which indicated that occupancy at crossing points differed between parallel routes and crossing routes, confirming that flight levels other than the reserved No PDC levels were likely to be available on the basis of real time coordination between the affected ACCs.

IFATCA - Proposed FLOS for the Manila FIR

3.16 IFATCA presented the meeting with a proposed FLOS for Manila FIR and revised co-ordination procedures between Manila FIR and adjacent FIRs which recognized and attempted to relieve the workload of Manila ACC in having to undertake flight level transition tasks in an area of unreliable radar coverage. IFATCA highlighted that all the surrounding areas had adopted the single alternate FLOS

and therefore, in the interest of ATC workload and harmonization of flight level arrangements, the WPAC/SCS modified single alternate FLOS assignment should be reconsidered to cater for the traffic in/out of the areas.

3.17 In relation to northeast-bound traffic on L625 and N884 transitioning from the SCS modified single alternate FLOS to single alternate FLOS levels prior to transfer to Fukuoka ATMC, it is proposed that Fukuoka ATMC restrict the allocation of flight levels to southwest-bound traffic on routes B462 and A582 within the Fukuoka FIR. The flight levels should comply with the 'crossing track' levels FL280, 300, 340 and 380 to avoid confliction with the opposite direction L625 traffic that Manila may not have been able to transition.

3.18 To manage southwest-bound traffic on N892, it is proposed that Taipei ACC be requested to carry out the transition from single alternate to SCS modified single alternate prior to transferring the traffic to Manila. N892 is uni-directional between HCN and KABAM, therefore there is no conflicting traffic to restrict transition prior to KABAM. IFATCA informed the meeting that discussions were still going on with Taipei in this regard, however early response from Taipei had highlighted that they were addressing other matters and did not have sufficient resources to fully consider the proposal at this time.

3.19 Southwest-bound traffic on M767 would be managed by Fukuoka ATMC carrying out the transition from single alternate to SCS modified single alternate prior to transferring the traffic to Manila. There is very little northeast-bound traffic on A590 between GURAG and TUNTO, therefore the transition could be completed prior to GURAG.

3.20 In considering these proposals, the meeting thanked IFATCA for their preparedness to be involved in addressing these complex issues and for the work that had gone into preparing this submission. A graphical presentation of these proposals has been included as **Appendix K**.

Adoption of Scenario 3 FLOS for the WPAC/SCS area

3.21 On the basis of all of the submissions that had been tabled, the meeting formed a small working group in order to fully examine each proposal and assess their respective merits. The meeting agreed that the proposal by Vietnam be used as a starting point as it appeared to have the most support. The meeting adopted this process and elected Mr. John Wagstaff (IFATCA) as Rapporteur.

3.22 The working group reviewed all the proposed the FLOSs, flight level allocations and transitions for the WPAC/SCS region. After much negotiation, collaboration and compromise on the part of each of the affected States, a general agreement was reached as to a FLOS proposal, known as Scenario 3, which combined the best aspects of many of the submissions.

3.23 The Scenario 3 FLOS proposal for the WPAC/SCS is detailed in **Appendix L** and represented the in-principle agreement of all parties at the meeting. The Scenario 3 FLOS was adopted as the basis for the future work of the Scrutiny Group and comprised a single alternate FLOS, with the exception of the six unidirectional parallel routes (L642, M771, N892, L625, N884 & M767) on which special high capacity arrangements had been agreed that involved managed use of all odd and even flight levels. The meeting agreed that the flight levels nominated under the Scenario 3 FLOS were the No-PDC levels and that other flight levels may be available with prior coordination.

3.24 The meeting recognized that the implementation of the new ATS route LGB-CAB-YURIX in the Manila and Fukuoka FIRs was an integral part of the Scenario 3 FLOS. Japan and the Philippines would coordinate on implementation arrangements and the meeting requested that the Regional Office raise awareness of the importance of this issue by State Letter to Japan and the Philippines. An item was added to the Task list in this respect.

3.25 In reviewing the Scenario 3 FLOS in the plenary meeting, it was recognized that formal agreement needed to be reached between Manila ACC, Taipei ACC and Naha ACC regarding the transition responsibilities for N892. Japan graciously agreed to assist the Scrutiny Group with this important activity and would convene and host a working group meeting between the affected parties to resolve the related issues. An item was added to the Task list in this respect.

Agenda Item 4: Safety and Airspace Monitoring Issues

Safety Assessment of FLOS Changes

4.1 The meeting agreed that key issues relating to the FLOS for the WPAC/SCS area would have to be addressed before any change could be made. In particular, the Secretariat emphasized that, in accordance with ICAO's safety management provisions in Annex 11 – *Air Traffic Services*, detailed safety assessments would need to be carried out by the States concerned. Also, MAAR would be required to undertake a safety assessment of the proposed FLOS for RVSM operations.

4.2 In light of the in-principle agreement that had been reached in relation to the Scenario 3 WPAC/SCS FLOS arrangements (as recorded in Agendas Item 3 above), the meeting agreed that States should undertake a full safety assessment in relation to the impact on their respective airspaces, including simulation trials if necessary, and provide feedback during the next Scrutiny Group meeting on any outstanding issues that required mitigation.

4.3 The meeting also requested that MAAR undertake a thorough examination of the proposed FLOS and undertake an RVSM safety assessment of the arrangements, providing feedback to the next Scrutiny Group meeting.

Plain Language Definition of LHD

4.4 The meeting recalled that during the first meeting of the Scrutiny Group extensive discussions had taken place regarding what actually comprised a RVSM Large Height Deviation (LHD). It was evident to WPAC/SCS RSG/1 that different interpretations were held by different States and that this had resulted in LHD reports being submitted for some occurrences that, although they were ATC coordination breakdown incidents resulting in flight level variance of 300 feet or more, were not actually LHD occurrences and therefore should not have been reported as such.

4.5 WPAC/SCS RSG/1 had noted that although the RVSM Handbook (Doc 9574) contained a number of references to LHD, these references were presented in complex and technical language which required significant interpretation. This had led to States reaching different conclusions and therefore assessing LHD based on non standardized criteria. In this context, and noting that there was not a standardized 'plain language' definition of a LHD available, WPAC/SCS RSG/1 requested that RASMAG urgently address this issue and promulgate a user friendly definition of LHD for wide application.

4.6 Following discussion, WPAC/SCS RSG/1 had agreed that conceptually a LHD occurrence involved a situation in which there was a lack of control. For example, an incident in which although an incorrect flight level had been coordinated, the receiving controller became aware of the correct flight level by other means (e.g. over the boundary radar observation before the flight entered the area) meant that the receiving controller gained some situational awareness before the flight entered the receiving airspace. Rather than a LHD, this situation was a breakdown of coordination incident and should be investigated accordingly. If however, this same scenario occurred in non-radar airspace and the receiving controller only became aware of the situation after the flight had entered the receiving airspace,

no opportunity was available to gain situational awareness before the flight entered the airspace and the situation was that of a LHD.

4.7 In considering the definition of what actually comprised a LHD, during WPAC/SCS RSG/1 IATA requested clarification of a situation in which a flight entered an RVSM airspace, flew for 2 hours before exiting that airspace but in that time period had no communications with the ground agency responsible for providing ATC services in that airspace. IATA considered that the inability of the flight to communicate information about any matter, including the flight level occupied by the flight, meant that up to date information about the flight was not available. In particular, the opportunity to report any deviation from flight level was not available and therefore it appeared reasonable that such a flight be considered as a LHD. WPAC/SCS RSG/1 requested the Secretariat also bring this matter to the attention of RASMAG.

4.8 The WPAC/SCS RSG/2 meeting was informed that the above matters were considered by the Seventh meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/7, 4-8 June 2007) and that a plain language definition of LHD and general guidance information on some of the possible causes of LHD was agreed by RASMAG/7 for distribution. As part of this work, the Large Height Deviation Categorizations presently used by Asia/Pacific Regional Monitoring Agencies (RMAs) were also reviewed and redrafted and an updated list of LHD categorisations was also adopted by RASMAG/7 for immediate use by Asia/Pacific RMAs (**Appendix M** refers).

4.9 Additionally, RASMAG/7 agreed that MAAR and PARMO should include both the plain language definition of LHD and a tick box question *'Were the Supervisors of the affected ACCs advised of this LHD occurrence'* on the LHD reporting template, in accordance with the suggestions raised by the first meeting of the Scrutiny Group. MAAR and PARMO would update their LHD reporting templates in due course.

Lost Communications as LHD?

4.10 In considering the complex question that had been posed to WPAC/SCS RSG/1 by IATA in relation to whether an aircraft suffering air-ground communications failure or similar inability to communicate with a ground station for an extended period of time should be treated as an LHD occurrence, RASMAG/7 engaged in extensive discussion. Subsequently, RASMAG/7 agreed that as a situation such as this would invoke established contingency procedures or, in other regional examples, be conducted under a managed and/or published airspace arrangement, the matter could not be considered a LHD as it would be managed by the contingency procedures that were implemented in response to the situation.

4.11 IFALPA raised concerns at this position expressed by RASMAG and considered that loss of communications for extended periods of time raises the potential for RVSM issues between affected air traffic. IFALPA was of the opinion that whilst pilot initiated actions to alert other traffic to their presence may help mitigate the effects (e.g. IFBP broadcasts), this could not be relied upon due to aircraft equipage limitations and redundancy of communications.

4.12 IFALPA is concerned that if no timely communication exists between the relevant ATSU and the aircraft for extended periods of time then no current data is available to positively confirm the current flight level. This is no less a matter of height keeping than a report at an incorrect altitude as the central theme is that the aircraft is not positively identified at the correct altitude at the correct time. Further IFALPA, understands that normal ATC investigation often does not resolve such problems and simply removing this data capture from the LHD reporting requirements does nothing to resolve such issues that are basic to the safety issues of air transportation.

4.13 IFALPA requested that this matter be again brought to the attention of RASMAG for review, requesting that RASMAG consider this type of occurrence to be included under LHD Categorization M – *'Others'*. IATA expressed firm support for the position expressed by IFALPA and joined IFALPA in requesting a further review by RASMAG. The Secretariat would bring the matter to the attention of RASMAG/8 scheduled in December 2007 and requested support from both IFALPA and IATA in preparing working paper submissions to RASMAG/8 in this regard. The meeting requested that RASMAG consider both the radar and non-radar situations.

Updated Horizontal safety assessment for SCS parallel route network

4.14 The meeting recalled that although the South China Sea parallel route structure had been implemented in November 2001, no updated horizontal safety assessment had been undertaken in the five and a half years since implementation. Additionally, data used in the implementation safety assessment had necessarily been based on the "old" route structure; as such no horizontal safety assessment had been made based on data from the "new" route structure.

4.15 In addition to establishing the Scrutiny Group to address matters related to the FLOS interface issues and the TLS not being met in the WPAC/SCS area, APANPIRG/17 had sought to urgently address the lack of current horizontal safety assessment for the South China Sea route structure by adopting Conclusion 17/6 urging concerned States to complete, by 30 June 2007, a horizontal safety assessment in accordance with ICAO ATS safety management provisions.

4.16 Recognizing the urgency of the situation, Thailand reported to RASMAG/6 (Nov 2006) that they had taken a decision to offer their full commitment in providing appropriate staffing and resources to MAAR in order to satisfy this additional task in accordance with the requirements of Conclusion 17/6. RASMAG/6 supported the initiatives of Thailand and encouraged MAAR to proceed in accordance with the proposal as presented to the meeting, thanking Thailand for their continued support.

4.17 During RASMAG/7, MAAR presented a copy of the completed *Safety Assessment for the South China Sea Airspace where a 60NM Lateral Separation Minimum is applied*. The safety assessment utilized the standard collision risk model applicable to these circumstances and adopted a Sequential Sampling Procedure in order to provide an outcome by way of a Probability Ratio Sequential Test. The safety assessment took into account that there had not been any report of Gross Navigational Error (GNE) during the previous 2 year period and that there had been a total of 108,337 flight movements from the four designated monitoring areas, these being DULOP-DUMOL, AKOTA-AVMUP, LULBU-LEGED, and MELAS-MABLI.

4.18 As a result of the aggregate total flight movements being below the minimum movement's threshold to provide a clear outcome, the Probability Ratio Sequential Test was inconclusive, indicating that the Test should be continued. However, as the difficulty was simply one of insufficient traffic numbers data to drive the test, inclusion of sufficient flight movement data would provide a clear outcome. Of significance to RASMAG was the fact that no GNEs had been reported in the 2-year sample being used and there was no likely reason for this stable situation to change in the future. In simple terms, it would be necessary for substantial numbers of GNEs to occur (i.e. more than 20) to cause a negative outcome to the Test.

4.19 Accordingly, RASMAG/7 agreed that the situation was stable and that there was no evidence to justify any concern. The inclusion of flight movements from GNE reports during 2007 would provide sufficient traffic numbers to pass the minimum movements' threshold and was expected to push the Probability Ration Sequential Test into the *"Route System meets Target Level of Safety"* area. In this context, RASMAG/7 agreed that safety assessment should be repeated within about 18 months to formally demonstrate that the TLS was being met, and then again periodically or when a significant change was likely to impact the traffic volume and/or disposition. In the interim, the present GNE

monitoring arrangements being managed by Hong Kong China, Philippines and Singapore should be continued to ensure data was available.

4.20 The availability of an up to date horizontal safety assessment adequately addressed one of the long term concerns of the RASMAG and, on behalf of the States concerned, RASMAG/7gave comprehensive thanks to Thailand for being prepared to absorb the costs in training for and undertaking this work, and demonstrating via an Annex 11 compliant process that there was no real reason for concern in respect to the safety of horizontal operations. The meeting hoped that Thailand would also be in a position to conduct a further periodic safety assessment of this nature in about 18 months time.

Agenda Item 5: Implementation Management Considerations

5.1 The meeting recalled that WPAC/SCS RSG/1 had developed a list of the critical activities that would need to be completed to implement any changes in the WPAC/SCS FLOS. As a result of discussions during WPAC/SCS RSG/2, the meeting noted the importance of ensuring compatibility with the FLOS to be implemented in China in late 2007 and added this to the list. Accordingly, the meeting considered that the actions required would encompass at least the following activities:

a) Review of operational factors relating to the FLOS;
b) Review compatibility with China FLOS;
c) Review of traffic movement data for the WPAC/SCS area;
d) Revised assignment of cruising levels;
e) Revised No-PDC procedures;
f) Identification of transition areas;
g) Development of transition procedures;
h) Completion of simulation trials;
i) Completion of safety assessments by ATS providers as part of SMS;
j) Completion of safety assessments by MAAR;
k) Completion of modeling of traffic flows;
l) Preparation and publication of AIP Supplement;
m) Completion of controller training;
n) Publication of relevant documents; and
o) Completion of amendments to operational Letters of Agreement.

Agenda Item 6: Future direction and arrangements

6.1 In considering how to progress the FLOS issues in the South China Sea/Western Pacific area, the meeting considered that the Scenario 3 FLOS described Agenda Item 3 provided a good basis for States to review. Provided no safety issues were identified by the safety analyses of Scenario 3 by any of the affected States or MAAR and consensus between States could be reached, the Scenario 3 FLOS would be implemented.

6.2 Accordingly, all participants at the meeting were urged to conduct a thorough review of all aspects of the Scenario 3 proposal, including operational and safety issues. The WPAC/SCS RSG/3 meeting will conduct a comprehensive review of the Scenario 3 FLOS based on State submissions, with a view to making a “Go/No Go” decision in relation to formal implementation of the Scenario 3 FLOS.

Agenda Item 7: Update WPAC/SCS RSG Task List

7.1 In reviewing the WPAC/SCS RSG task list, the meeting was apprised of the status of items considered complete and suitable for closure as well as those remaining open, noting the progress that had been made. Additional items were added, amongst others, in relation to the conduct of a full review of the Scenario 3 FLOS proposal by States, including Annex 11 compliant safety assessments, and the conduct of a RVSM safety assessment of the Scenario 3 FLOS by MAAR.

7.2 The meeting agreed that the updated task list included as **Appendix N** accurately reflected the work programme of the WPAC/SCS RSG.

7.3 All participants at the meeting were urged to address the task list items expeditiously in order to correct the issues with RVSM operations in the WPAC/SCS as soon as possible. The Chairman noted that each day that the TLS was not met was one day too many. States and international organizations were requested to provide updated information on the actions taken to the next meeting of the Scrutiny Group that was scheduled in late October, 2007.

Agenda Item 8: Any Other business

8.1 Indonesia gave a presentation in relation to the new Makassar ATS Centre at Ujung Pandang. A supporting video highlighted the step from the old fashioned technology at the old ACC to the modern automated ATM system implemented at the new centre. The new centre comprised 5 Sectors, 2 Approach Units and one Control Tower. Indonesia informed the meeting that ATS services in Indonesian airspace were provided from 2 ACCs, 24 Approach Control Units and 48 Towers. The meeting thanked Indonesia for this informative presentation.

Agenda Item 9: Date and venue of the WPAC/SCS RSG/3 meeting

9.1 The meeting acknowledged that although good progress had been made by both RSG/1 and RSG/2, there was still significant work to be completed by States in order to progress the matters identified during these meetings. Nevertheless, a Scrutiny Group meeting later in the year would be beneficial in reviewing the progress and provide a forum enabling coordination in relation to outstanding matters. Accordingly, the meeting agreed that the WPAC/SCS RSG/3 meeting would be held over 4 days from 30 October to 2 November 2007. The venue for the meeting would be confirmed at a later time.

Closing Remarks

10.1 The Chairman expressed his thanks to the members of the WPAC/SCS RSG for their participation and commitment to working through difficult issues in order to achieve the goals set forth for the second meeting. Once again the work of the group had resulted in positive steps towards resolving the issues surrounding the inability to meet the TLS for RVSM. Reaching in-principle agreement on the Scenario 3 FLOS was a significant step forward and the Chairman considered that the success of this meeting was directly attributable to the willingness of the participants to work together collaboratively in a selfless manner.

10.2 The Chairman thanked the Secretariat for the invaluable support, which he considered was a significant contributor to the overall progress that the WPAC/SCS RSG was achieving. The Chairman also thanked the Asia/Pacific Office for providing such a wonderful forum for the meeting, a factor which was also important to achieving results.

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

WORKING PAPERS

NUMBER	AGENDA	TITLE	PRESENTED BY
WP/1	1	Provisional Agenda for WPAC/SCS RSG/2	Secretariat
WP/2	3	Proposed Flight Level Orientation Scheme (FLOS) for the Manila FIR	IFATCA
WP/3	3	Flight Level Orientation Scheme for the Manila FIR	Philippines
WP/4	7	Update Task List from WPAC/SCS RSG	Secretariat
WP/5	4	Summary of the Airspace Safety Review for the RVSM Implementation in the Western Pacific/South China Sea (WPAC/SCS) Airspace	MAAR
WP/6	4	Plain Language Definition of Large Height Deviation	Secretariat
WP/7	3	RVSM Operations within Ha Noi and Ho Chi Minh FIRs	Viet Nam
WP/8	3	Study on Proposed Flight Level Orientation Schemes (FLOS)/ Flight Level Allocation Scheme (FLAS) in Singapore FIR	Singapore

INFORMATION PAPERS

NUMBER	AGENDA	TITLE	PRESENTED BY
IP/1	-	List of Working Papers (WPs) and Information Papers (IPs)	Secretariat
IP/2	3	Review of the 30th Meeting of the RVSM Implementation Task Force and the Special Co-ordination Meeting for the RVSM Implementation by China	Secretariat
IP/3	8	The First Meeting of the Western Pacific/South China Sea RVSM Scrutiny Group (WPAC/SCS RSG/1)	Secretariat
IP/4	4	Measures for LHD on the Airway A590	Japan

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Traffic Sample Data – December 2006

Note 1: HCM = Ho Chi Minh, HKK = Hong Kong, MAN = Manila, SIG = Singapore and SYA = Sanya

Note 2: Based on the one month December 2006 traffic sample data, average daily flight movements on routes in the WPAC/SCS region were summarized by the Monitoring Agency for the Asia Region (MAAR) as shown below. MAAR reported that there could be some inconsistencies, due to accuracy of the submitted data, and flight movements at certain fixes on the SCS parallel routes had been interpolated based on the submitted traffic sample data.

Fixes on Route L642 and M771

FIR	Route	Fix	Flights
HKK	L642	EPKAL	73
SYA	L642	EXOTO	69
SYA	L642	EPKAL	69
SYA	L642	EGEMU	69
SIG	L642	ESPOB	67
HCM	L642	EXOTO	66
HCM	L642	ESPOB	59
HCM	L642	KARAN	56
HCM	L642	PTH	56
HCM	L642	ELSAS	56
HCM	L642	CS	56
HCM	L642	EKIMA	56
HCM	L642	VEPAM	56
HKK	L642	EPDOS	37
HKK	L642	ENBOK	26

FIR	Route	Fix	Flights
SYA	M771	DONDA	69
SYA	M771	DOSUT	68
SIG	M771	DUDIS	67
HKK	M771	DOSUT	67
HCM	M771	DUDIS	63
HCM	M771	DONDA	62
HCM	M771	DAGAG	60
HCM	M771	DAMVO	60
HCM	M771	DOXAR	60
HCM	M771	DAMEL	60
HCM	M771	DIVSI	60
SIG	M771	DOLOX	20

Fixes on Route N892 and L625

FIR	Route	Fix	Flights
MAN	N892	MIGUG	40
MAN	N892	KABAM	38
MAN	N892	MAVRA	37
MAN	N892	MUMOT	37
MAN	N892	MIKIN	37
HCM	N892	MIGUG	31
SIG	N892	MELAS	29
HCM	N892	MELAS	29
HCM	N892	MONBO	28
HCM	N892	MESOX	28
HCM	N892	MUGAN	28
HCM	N892	MIMUX	28
HCM	N892	MAPNO	28
HCM	N892	MOXON	28

FIR	Route	Fix	Flights
MAN	L625	ARESI	40
HCM	L625	ARESI	37
SIG	L625	AKMON	31
HCM	L625	AKMON	31
HCM	L625	ALDAS	31
HCM	L625	AGSAM	31
HCM	L625	ANOKI	31
MAN	L625	AKOTA	26
MAN	L625	AVMUP	24
MAN	L625	AGVAR	17
MAN	L625	ALDIS	17
MAN	L625	MEVIN	16

Fixes on Route N884 and M767

FIR	Route	Fix	Flights
MAN	N884	LAXOR	20
SIG	N884	LAXOR	19
MAN	N884	LULBU	13
MAN	N884	LEGED	11

FIR	Route	Fix	Flights
SIG	M767	TEGID	30
MAN	M767	TEGID	30
MAN	M767	TENON	13
MAN	M767	TOSOV	12
MAN	M767	TOKON	11
SIG	M767	TEGID	30

Fixes on Route A1/P901 and A202

FIR	Route	Fix	Flights
HKK	P901	IKELA	99
SYA	P901	ITBAM	97
SYA	P901	IKELA	97
HCM	P901	ITBAM	82
HKK	A202	SIKOU	67

FIR	Route	Fix	Flights
HKK	A1	ELATO	123
HCM	A1	PAPRA	110
SYA	A1	BUNTA	54
SYA	A1	DAGON	53
HCM	A1	BUNTA	51
HKK	A1	MAGOG	48
HKK	A1	VMMC	42

Fixes on Route M765 and W1

FIR	Route	Fix	Flights
HCM	M765	IGARI	22

FIR	Route	Fix	Flights
HCM	W1	AC	38
HCM	W1	HAMIN	21

Fixes on Route M768 and L628

FIR	Route	Fix	Flights
SIG	M768	AKMON	19
SIG	M768	ASISU	18
HCM	M768	AKMON	16

FIR	Route	Fix	Flights
HCM	L628	ARESI	19
MAN	L628	ARESI	15
MAN	L628	IBOBI	10

Fixes on Route A583 and A461

FIR	Route	Fix	Flights
MAN	A583	SABNO	37
HKK	A583	SABNO	26

FIR	Route	Fix	Flights
MAN	A461	NOMAN	77
HKK	A461	NOMAN	54

Large Height Deviation Categorizations applicable prior to June 2007.

Code	LHD Cause
A	Failure to climb/descend as cleared
B	Climb/descend without ATC Clearance
C	Entry into airspace at an incorrect flight level
D	Deviation due to turbulence or other weather related cause
E	Deviation due to equipment failure
F	Deviation due to collision avoidance system (TCAS) advisory
G	Deviation due to contingency event
H	Aircraft not approved for operation in RVSM restricted airspace
I	ATC system loop error; (e.g. pilot misunderstands clearance message or ATC issues incorrect clearance)
J	Equipment control error encompassing incorrect operation of fully functional FMS or navigation system (e.g. by mistake the pilot incorrectly operates INS equipment)
K	Incorrect transcription of ATC clearance or re-clearance into the FMS
L	Wrong information faithfully transcribed into the FMS (e.g. flight plan followed rather than ATC clearance or original clearance followed instead of re-clearances)
M	Error in ATC-unit-to ATC-unit transferred/transition message
N	Negative transfer received from transferring/transition ATC-unit
O	Others

MEMORANDUM OF UNDERSTANDING
AMONG
JCAB AIR TRAFFIC MANAGEMENT CENTER
MANILA AREA CONTROL CENTER
NAHA AREA CONTROL CENTER

Effective: 0000UTC, June 1, 2007

SUBJECT: Mutual reporting of Large Height Deviation (LHD) occurrences among JCAB Air Traffic Management Center (ATMC), Manila Area Control Center (ACC) and Naha ACC.

1. PURPOSE

In order to ensure the timely reporting of LHD occurrences equal to or greater than 300 ft for any reason by the respective Centers and consequently enhance airspace safety in RVSM operation, ATMC, Manila ACC and Naha ACC agree to implement a mutual reporting when LHD has occurred.

2. SCOPE

The procedures contained herein are supplementary to the Letter of Agreement (LOA) between ATMC and Manila ACC, dated February 15, 2006, and the LOA between Manila ACC and Naha ACC, dated February 15, 2006. This notification of the LHD occurrence shall be used only for the airspace safety monitoring.

Note: LHD report should be submitted independently of this notification.

3. PROCEDURES

When LHD is observed or reported, the supervisor of the Center which has obtained the fact should inform the supervisor of the Center concerned about the LHD occurrence in a timely manner.

4. MODIFICATION

Modifications to this Memorandum of Understanding may be accomplished anytime by mutual consent of all parties concerned.

Masao Kume	Michael E. Mapanao	Mitsuo Nozaki
Chief ATM Officer	Chief Controller	Chief Controller
JCAB Air Traffic Management Center	Manila Area Control Center	Naha Area Control Center

RVSM FLIGHT LEVEL ORIENTATION SYSTEM (FLOS) IN CHINA

Implement metric RVSM level in China, 300-meter vertical separation is applied between 600 meters and 8400 meters (maintain current situation unchanged); 500-meter vertical separation is applied between 8400 meters and 8900 meters; 300-meter vertical separation is applied between 8900 meters and 12500 meters; 600-meter vertical separation is applied above 12500 meters. Airspace from 8900 meters to 12500 meters is defined as RVSM Airspace.

Meanwhile, in order to ensure that the vertical separation between two pairs of flight levels is equal or above 1000 feet after converting metric flight level into feet and rounding the result by 100feet:

For Metric flight level from 8900 meters to 9800 meters, the corresponding flight level in feet shall be rounded down to the nearest 100 feet. For instance, 8900meters (namely 29,199 feet) shall be rounded down to 29100feet;

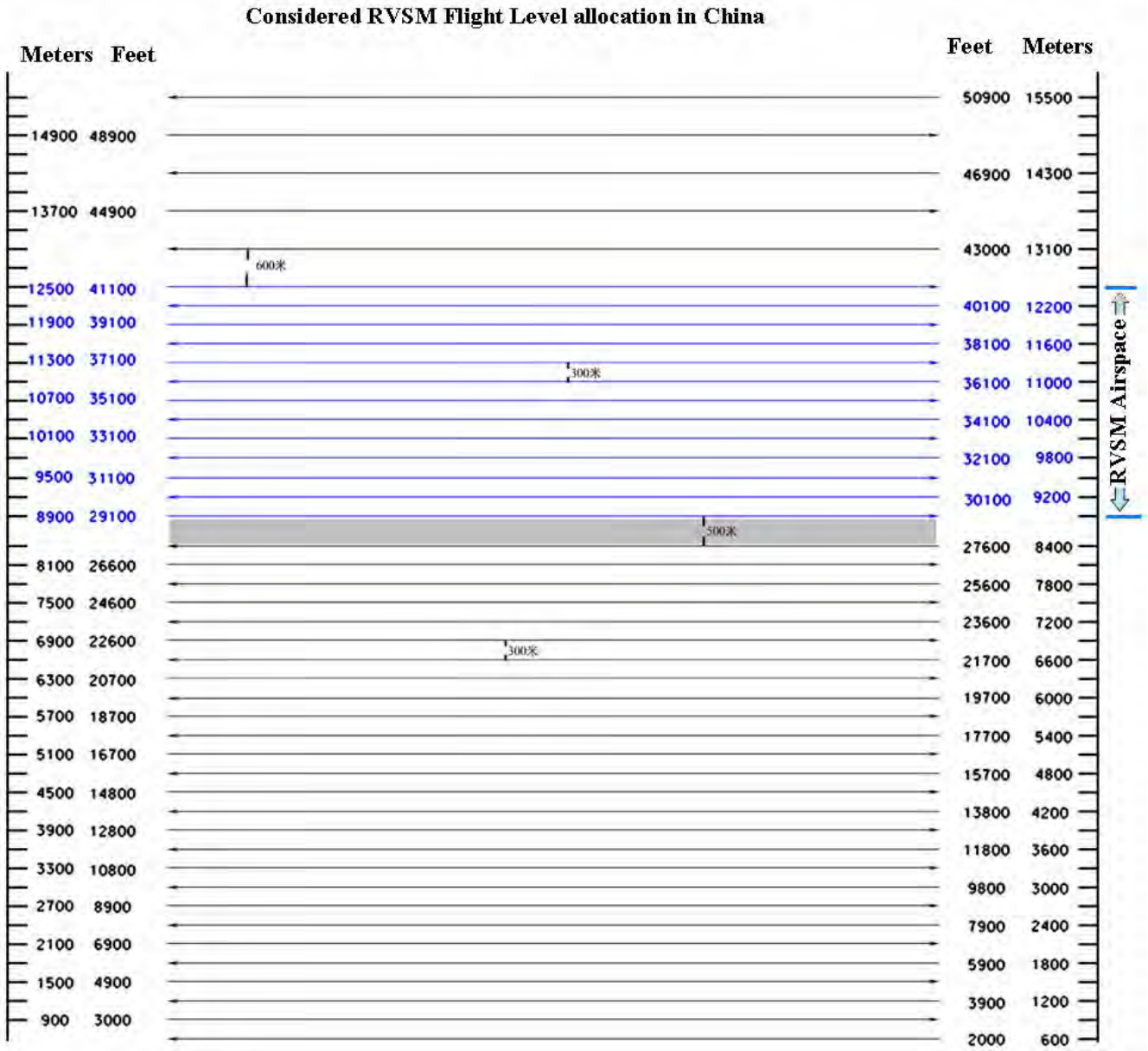
For Metric flight level from 11900 meters to 12500 meters, the corresponding flight level in feet shall be rounded up to the nearest 100 feet. For instance, 12,500 meters (namely 41,010 feet) shall be rounded up to 41,100 feet.

Thus, between 8900meters and 12500meters, all the actual vertical separations during flight for Boeing, Airbus and internationally manufactured aircraft will be 1000 feet when they fly the corresponding feet flight level.

Detailed RVSM metric flight level option: fly eastward: 8900, 9500, 10100, 10700, 11300, 11900, 12500meters, etc; fly westward: 9200, 9800, 10400, 11000, 11600, and 12200meters. Corresponding feet flight levels: fly eastward: 29100, 31100, 33100, 35100, 37100, 39100, 41100feet; fly westward: 30100, 32100, 34100, 36100, 38100, and 40,100 feet.

Advantages: Satisfy military requirements of applying metric levels, and overcome the relatively big altitude difference between metric RVSM level and ICAO RVSM flight levels of neighboring countries; eliminate the phenomena of 900feet vertical separation and make the vertical separation during actual flight be 1000 feet or above to ensure safety. For metric level, eastbound level is odd and westbound level is even. For the corresponding RVSM flight levels (from 29100 to 41100) in feet, each flight level is 100 feet above ICAO RVSM FL, so it is very easy for pilot to operate and use, and it is also easy for the transition to/from neighboring countries RVSM FL. Airspace from 8900 meters to 12500 meters is defined as RVSM Airspace, so 500 meters vertical separation between 8400 to 8900m can act as an buffer and non-RVSM aircraft will fly at and below 8400 m or above 12500 m. Pilots shall use the China RVSM FL reference table/map and strictly fly the corresponding flight level in feet when instructed to fly a specific metric flight level. The pilots DO NOT need to remember how to round off (up or down), just follow the China RVSM FL reference table/map.

Disadvantages: In the case of 12500 meters, 1253 (which means 12530 meters) may be shown on the radar display of the controller due to the difference between the actual flight altitude and RVSM metric flight level (The maximum difference is only 90feet and the maximum difference displayed by radar is 30 meters. As indicated in ICAO DOC4444, The tolerance value used to determine that Mode C-derived level information displayed to the controller is accurate shall be ±60 m (±200 ft) in RVSM airspace. An aircraft is considered to be maintaining its assigned level as long as the SSR Mode C-derived level information indicates that it is within ±60 m (±200 ft) tolerance of the assigned level). The controller should be well aware of this and also adapt to it. Certainly, this kind of phenomena also exists in the flight levels presently used in China which the controllers are already familiar with. Through RVSM radar simulation in Guangzhou Area Control Center, the controllers think that this kind of phenomena can be overcome with necessary training.


Considered RVSM Flight Level allocation in China
Meters Feet
Feet Meters
14900 48900
13700 44900
12500 41100
11900 39100
11300 37100
10700 35100
10100 33100
9500 31100
8900 29100
8100 26600
7500 24600
6900 22600
6300 20700
5700 18700
5100 16700
4500 14800
3900 12800
3300 10800
2700 8900
2100 6900
1500 4900
900 3000
50900 15500
46900 14300
43000 13100
40100 12200
38100 11600
36100 11000
34100 10400
32100 9800
30100 9200
27600 8400
25600 7800
23600 7200
21700 6600
19700 6000
17700 5400
15700 4800
13800 4200
11800 3600
9800 3000
7900 2400
5900 1800
3900 1200
2000 600
600米
300米
500米
300米
RVSM Airspace

Considered RVSM Flight Level allocation in China

Orientation	Metric RVSM FL Meters	Metric RVSM FL Converted into feet Feet	Metric RVSM FL Converted into feet and round to 100 feet (Pilots actually fly FL) Feet	Actual altitude displayed by controller radar (4-digit number)
Eastbound	14900	48885	48900	1490
Westbound	14300	46916	46900	1430
Eastbound	13700	44948	44900	1369
Westbound	13100	42979	43000	1311
Eastbound	12500	41010	41100	1253
Westbound	12200	40026	40100	1222
Eastbound	11900	39042	39100	1192
Westbound	11600	38058	38100	1161
Eastbound	11300	37073	37100	1131
Westbound	11000	36089	36100	1100
Eastbound	10700	35105	35100	1070
Westbound	10400	34121	34100	1039
Eastbound	10100	33136	33100	1009
Westbound	9800	32152	32100	0978
Eastbound	9500	31168	31100	0948
Westbound	9200	30184	30100	0917
Eastbound	8900	29199	29100	0887
Westbound	8400	27559	27600	0841
Eastbound	8100	26575	26600	0811
Westbound	7800	25591	25600	0780
Eastbound	7500	24606	24600	0750

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Your comments and suggestion will be much appreciated.

**SOME CONSIDERATIONS IN MORE DETAILS
ABOUT RVSM IMPLEMENTATION IN CHINA**

We understand clearly the requirement to use feet worldwide. To use metric flight level in China is our national policy and metric is also the SI and feet is NON-SI. All the national aviation industry is based on meters. China will not follow the feet system and continued argument on this issue only result in delaying the implementation on RVSM. So the question is how to implement metric RVSM flight level in China.

China has implement 300 meters vertical separation below 8400 meters for many years, so it is natural that we can implement 300 meters vertical separation below 12500 meters in a safety way. All the ICAO documentation use 300 meters or 1000 feet, which indicates that 300 meters is also ICAO standards. It is advised that you can consult the pilots who have experiences of operating in Chinese airspace.

For China RVSM Flight level, Pilots shall use the China RVSM FL reference table/map and strictly fly the corresponding flight level in feet when instructed to fly a specific metric flight level. The pilots DO NOT need to remember how to round off (up or down), just follow the China RVSM FL reference table/map. Pilot will not wrongly round off the next 100m as long as they follow the China RVSM FL reference table/map. How you do it today, and then how you will do it in future in terms of the flight level setting. There is no big difference.

It is likely that the China RVSM flight level option is: fly eastward: 29100, 31100, 33100, 35100, 37100, 39100, 41100feet; fly westward: 30100, 32100, 34100, 36100, 38100, and 40,100 feet. Just forget the meters! All RVSM Flight Levels are 100 feet above ICAO. As indicated in DOC4444, The tolerance value used to determine that Mode C-derived level information displayed to the controller is accurate shall be ±60 m (±200 ft) in RVSM airspace. An aircraft is considered to be maintaining its assigned level as long as the SSR Mode C-derived level information indicates that it is within ±60 m (±200 ft) tolerance of the assigned level. It is very easy for the transition to other adjacent countries.

ICAO AN-Conf/11 Recommendation 4/9 — Harmonization of flight level assignment methodology across flight information boundaries

That relevant States, when planning for the introduction of reduced vertical separation minimum (RVSM) at interfaces between airspaces where different units of measurement are used, taking into account relevant operational and technical considerations, should apply a common cruising levels structure in accordance with the tables of cruising levels expressed in metres or feet, as outlined in Annex 2 — Rules of the Air, Appendix 3.

At the Eleventh Air Navigation Conference (ANConf/11), Montreal, 22 September to 3 October 2003, the WP119 indicates that:

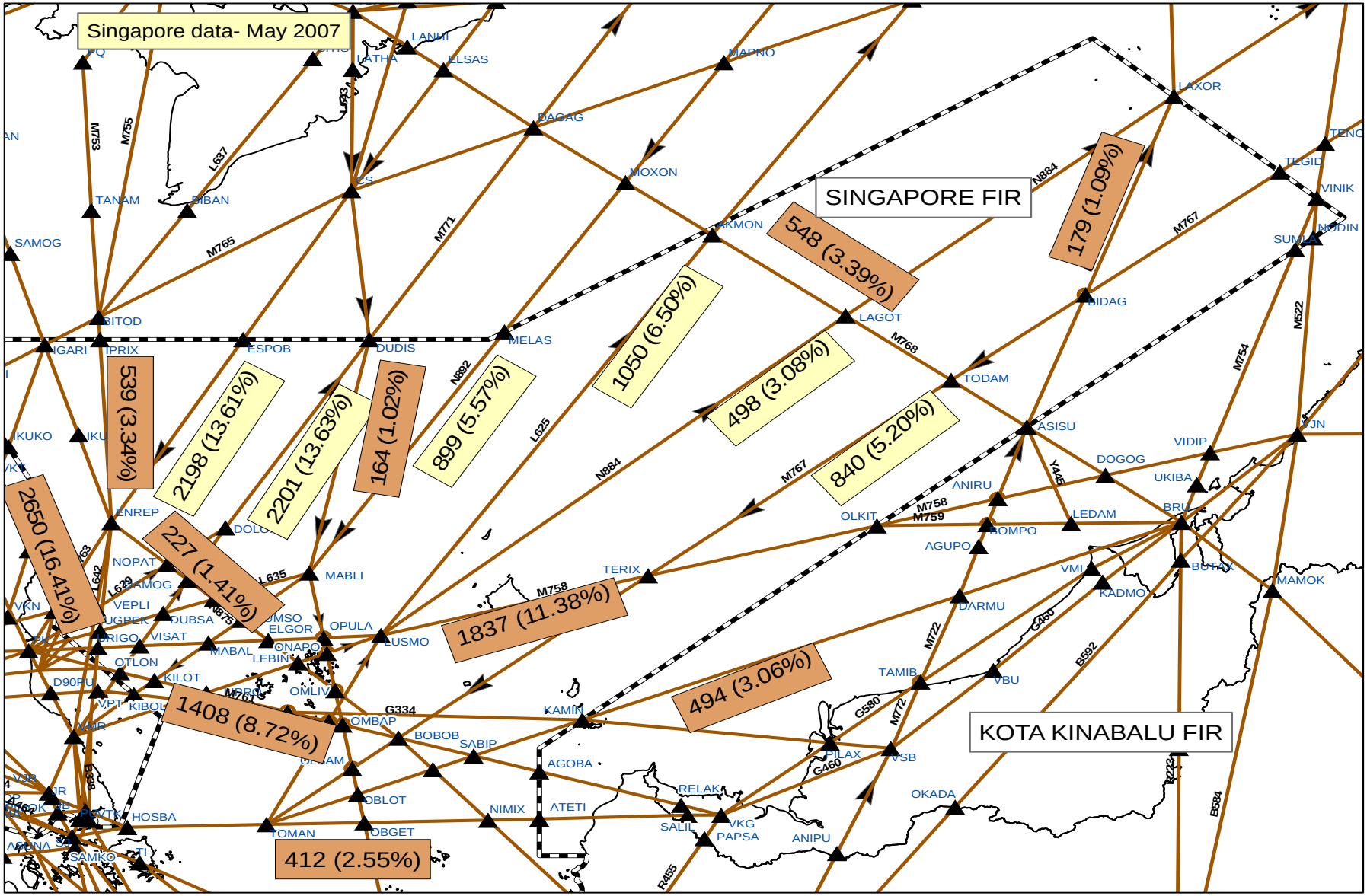
Annex 2 — Rules of the Air, Appendix 3, Table of Cruising Levels. When the common cruising levels structure and corresponding vertical separation minima, expressed in metres or feet, as outlined in Annex 2 were adhered to, the maximum difference in cruising level experienced by any aircraft transitioning between metres and feet was 23 m (75 ft). By contrast, on some regional boundaries where this conversion was made today using State-specific procedures for conventional vertical separation (500 m or 2 000 ft), the cruising level difference was as great as 287 metres (941 ft) and averaged over 165 m (541 ft). Differences between individual ATS units cruising level procedures were mitigated in many cases by sterilization of altitudes within one or both flight information regions.

Now, China RVSM FL is only 100 feet above the ICAO feet flight level, which is only slightly larger that the 23 m (75 ft) as indicated above.

Before RVSM, China need conduct flight level transition with all adjacent countries, and after implementing RVSM, the flight level transition with will be very easy with adjacent countries expect Russia, Mongolia and DPRK. But after Russia, Mongolia also implement, the flight level transition will not be a problem any more.

There is not problem for the STL. Some one said that altitude band will have variances from the ICAO safety assessment done on separation std based on 1000ft - a direct impact on the TLS assessment and future implications in regional safety assessment, however small. Actually, the corresponding flight level in feet is 1000 feet in RVSM airspace. The STL shall be the same when we use RVSM flight level such as 29100, 30100, 31100, … or we use flight level such as 29000, 30000, 31000, …. Of course, for the military aircraft which use meters, we will use 600 meters vertical separation.

Most of the military aircraft can only fly in metric flight level and only metric flight level setting is available. There are also very small number of China manufactured transport aircraft can only fly in metric flight level and only metric flight level setting is available. China will follow the exclusive RVSM airspace policy. For all these aircraft, we will apply 600 meters vertical separation if they can operate in RVSM airspace. In this way, we can eliminate the phenomena of 270 meters vertical separation when one aircraft flies actually the corresponding flight level in feet (such as 30100 feet, which equal to 9170 meters) and another one flies actually the metric flight level (such as 8900 meters). 1000 feet will only be applied among the aircraft which is actually flying the RVSM flight level such as 29100, 30100, 31100 feet…


Singapore data- May 2007
SINGAPORE FIR
KOTA KINABALU FIR
548 (3.39%)
179 (1.09%)
1050 (6.50%)
498 (3.08%)
840 (5.20%)
899 (5.57%)
164 (1.02%)
2201 (13.63%)
2198 (13.61%)
539 (3.34%)
2650 (16.41%)
227 (1.41%)
1837 (11.38%)
494 (3.06%)
1408 (8.72%)
412 (2.55%)
LANNI
ELSAS
MAPNO
DAGAG
MOXON
LAXOR
TEGID
VINIK
NODIN
SUMLA
TANAM
BIBAN
SAMOG
BITOD
IGARI
IPRIX
ESPOB
DUDIS
MELAS
ARMON
LAGOT
BIDAG
TODAM
ASISU
VJN
VIDIP
DOGOG
UKIBA
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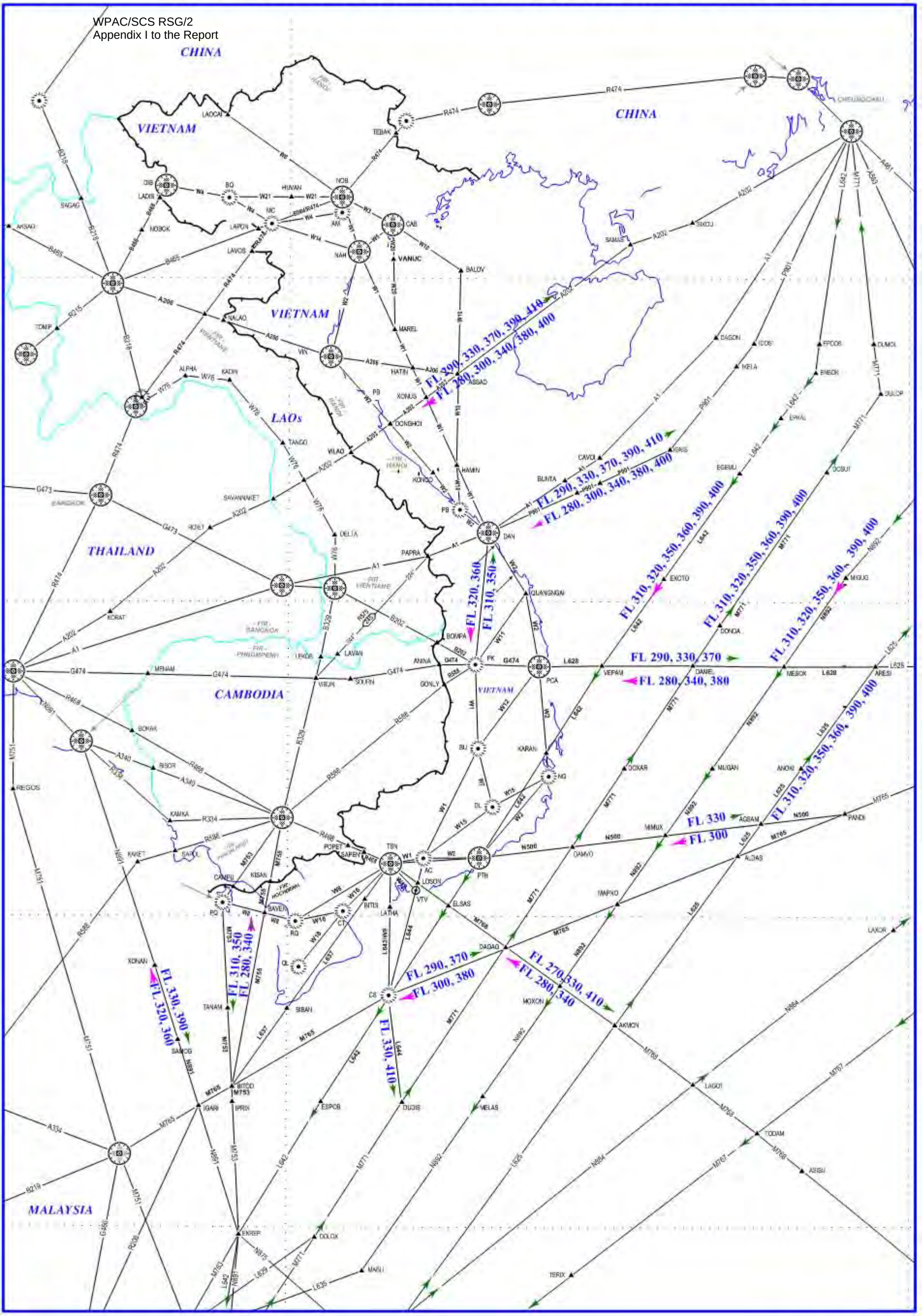
KADMO
DARMU
TAMIB
VBU
PLAX
VSB
OKADA
ANIPU
PAPSA
VKG
SALIL
IRELAK
NIMIX
ATETI
AGOBA
KAMIN
TOMAN
OBGET
OBLOT
BOBOB
SABIP
OMBAP
OMLIV
LUSMO
OPULA
TERIX
ONAPO
LEBIN
MABAL
ELGOR
OMSO
DUBSA
VISAT
OTLON
KILOT
VEPLI
NOPAT
MABLI
DOLO
ENREP
IKUKO
HOSBA
SAMKO
M753
M755
M765
M771
M767
M768
M758
M759
M754
M522
M72
N884
N892
L625
L635
L637
G460
G580
G334
B592
B584
R455

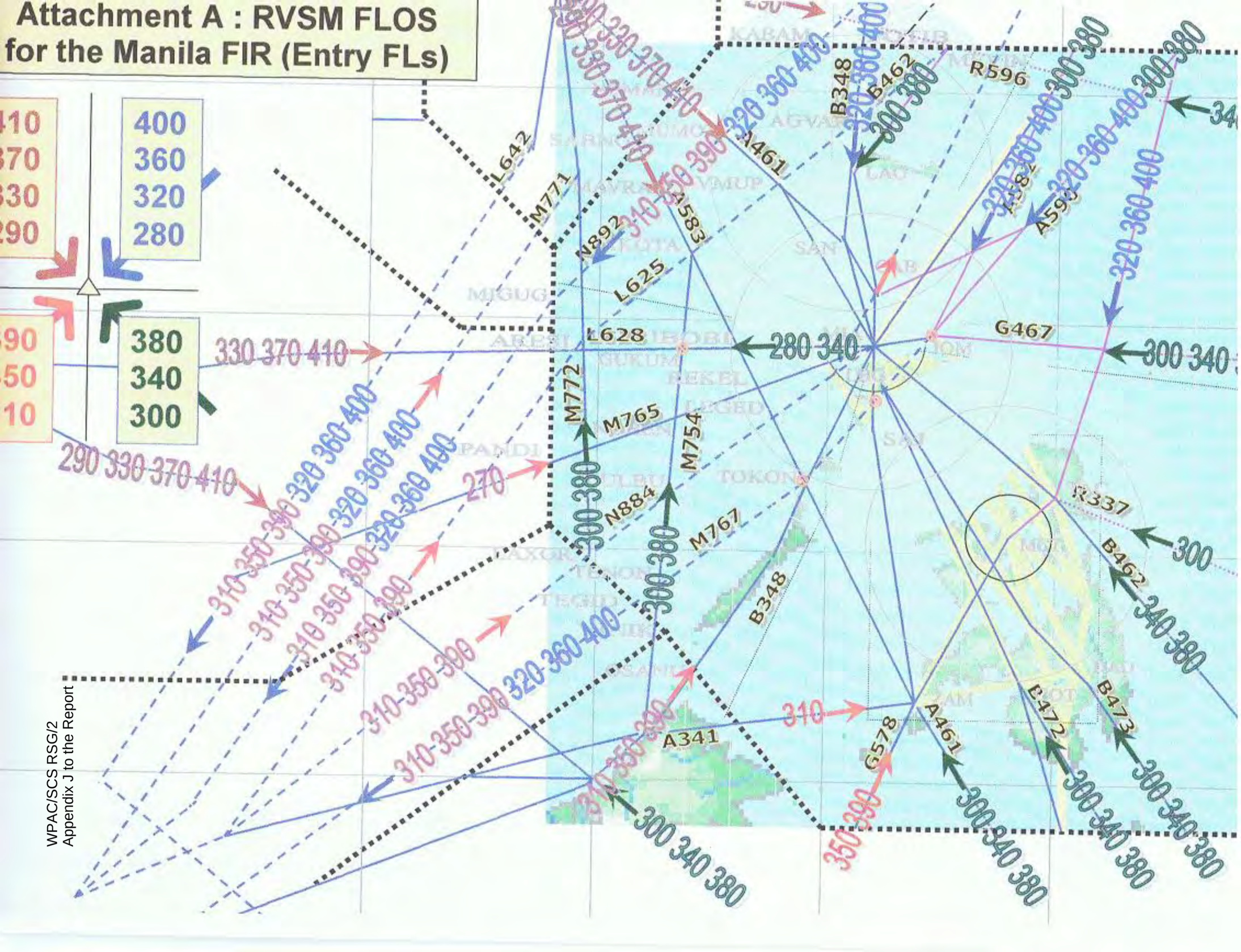
VIETNAM - PROPOSED RVSM FLOS WITHIN HANOI AND HO CHI MINH FIR

Routes	*Usable FLOS/FLs*	**No-PDC FLs**	**No-PDC FLs for large-scale WX deviations**
L642, M771, N892, L625 *(Class I)*	Modified FLOS. All usable FLs	FL310, 320, 350, 360, 390, 400	***EB:*** FL310, 350, 390
			WB: FL320, 360, 400
L628, G474/L628 *(Class II)*	Single FLOS. All usable FLs	***EB:*** FL290, 330, 370	***EB:*** FL290, 330, 370
		WB: FL280, 340, 380	***WB:*** FL280, 340, 380
N500 *(Class II)*	Single FLOS. All usable FLs	***EB:*** FL330	
		WB: FL300	
M765 *(Class II)*	Single FLOS. All usable FLs	***NEB:*** FL290, 370	
		SWB: FL300, 380	
M768, R468-M768 *(Class II)*	Single FLOS. All usable FLs	***SEB:*** FL270, FL330, 410	
		NWB: FL280, 340	
M753, M755 *(Class III)*	Single FLOS. All usable FLs	***SB:*** FL310, 350	
		NB: FL280, 340	
L644 *(Class II)*	Single FLOS. All usable FLs	***SB:*** FL330, 410	
N891 *(Class III)*	Single FLOS. All usable FLs	***SEB:*** FL330, 390	
		NWB: FL320, 360	
A1/P901, A202 *(Class IV)*	Single FLOS. All usable FLs	***EB:*** FL290, 330, 370, 390, 410	
		WB: FL280, 300, 340, 380, 400	
W1, W2 *(Class III)*	Single FLOS. All usable FLs	***NB:*** FL310, 350	
		SB: FL320, 360	
A206, R474, B465 *(Class IV)*	Single FLOS. All usable FLs	All usable FLs	
Other domestic routes	Single FLOS All usable FLs		

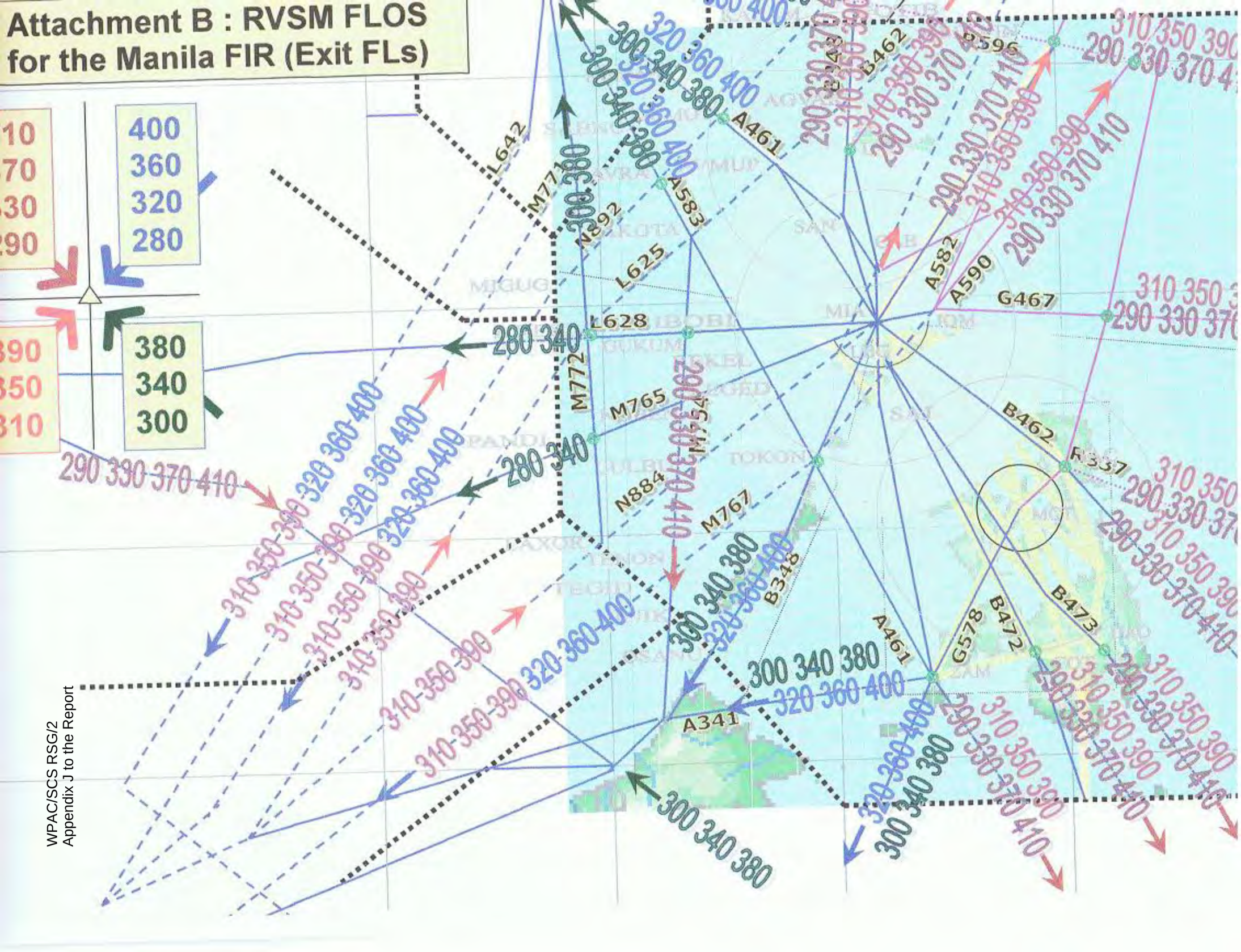
Note: EB: **Eastbound** SB: **Southbound** SEB: **Southeast bound**
WB: Westbound **NB: Northbound** **NWB: Northwest bound**

PROPOSED NO-PDC FLs ON ATS/RNAV ROUTES WITHIN HA NOI AND HO CHI MINH FIRS



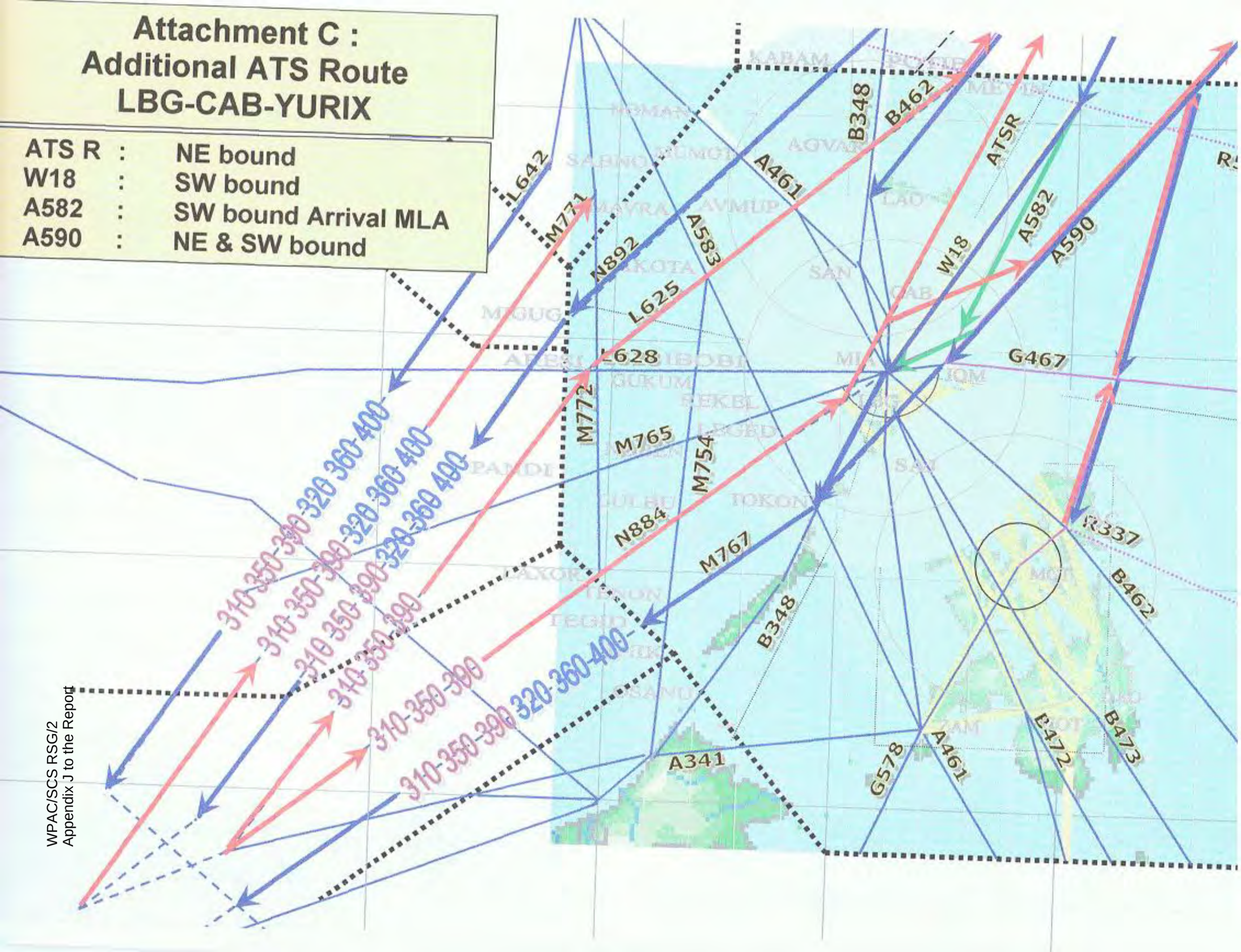

Attachment A : RVSM FLOS
for the Manila FIR (Entry FLs)
400
360
320
280
380
340
300
L642
M771
N892
L625
L628
M772
M765
M754
N884
M767
L583
A461
B348
B462
R596
A582
A591
G467
R337
B472
B473
G578
A461
A341
L472
270
280 340
300 340
300 380
310
350 390
330 370 410
290 330 370 410
310 350 390 320 360 400
WPAC/SCS RSG/2
Appendix J to the Report

Attachment B : RVSM FLOS for the Manila FIR (Exit FLs)

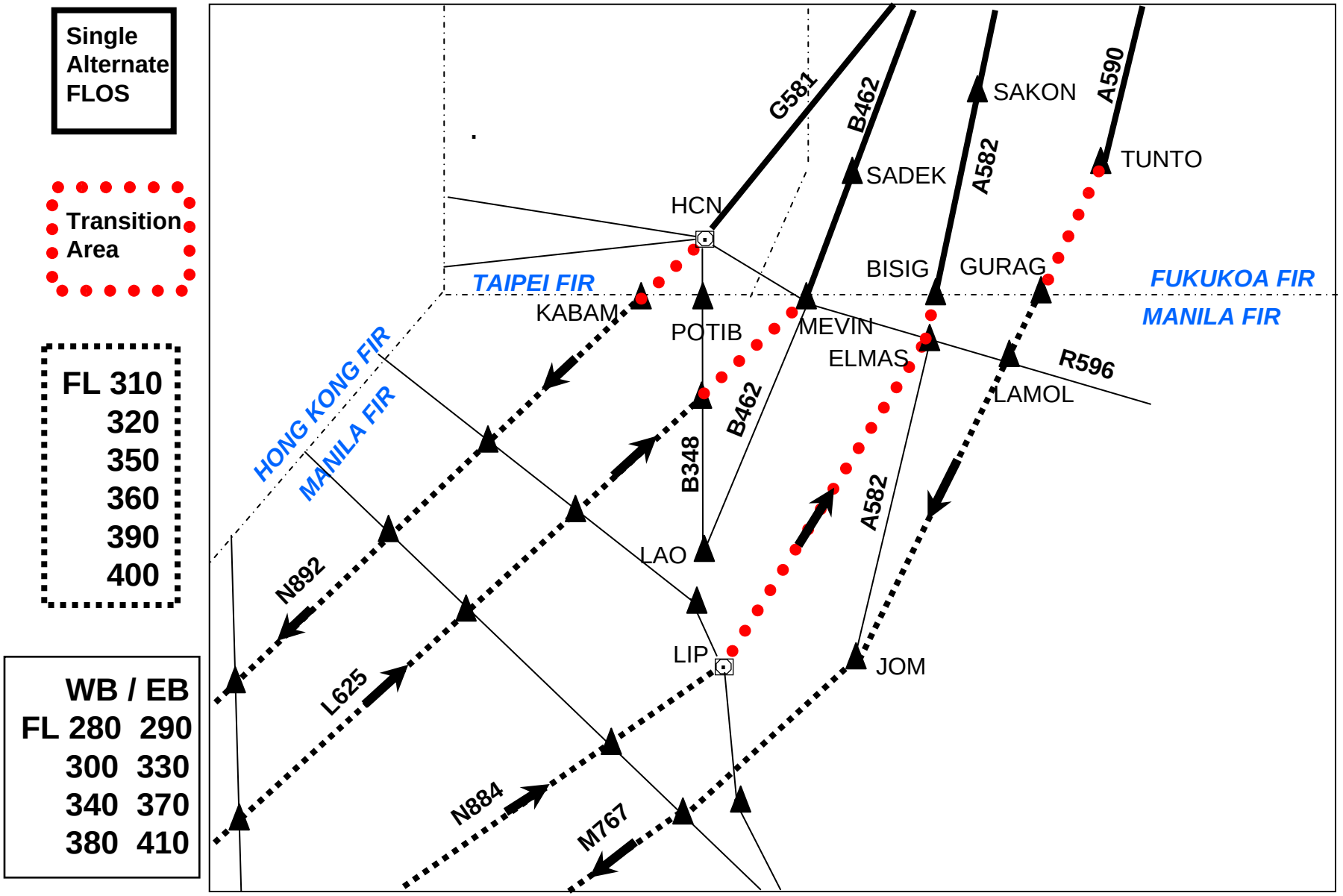


Attachment C :
Additional ATS Route
LBG-CAB-YURIX

ATS R	:	NE bound
W18	:	SW bound
A582	:	SW bound Arrival MLA
A590	:	NE & SW bound



Scenario 2.1


Single
Alternate
FLOS
Transition
Area
FL 310
320
350
360
390
400
WB / EB
FL 280 290
300 330
340 370
380 410
TAIPEI FIR
HONG KONG FIR
MANILA FIR
FUKUOKA FIR
MANILA FIR
HCN
KABAM
POTIB
MEVIN
BISIG
GURAG
ELMAS
LAMOL
LAO
LIP
JOM
SADEK
SAKON
TUNTO
G581
B462
A582
A590
R596
B348
B462
A582
N892
L625
N884
M767

WPAC/SCS RVSM Scrutiny Working Group

Scenario 3 FLOS for Western Pacific/South China Sea area

Route	Levels Listed are No-PDC Flight Levels. Other Levels available with prior approval	FIRs	Transition
L642 M771 N892 L625	EB & WB - FL310, 320, 350, 360, 390, 400 ***Note: Transition arrangements for N892 and L625 are subject to working group meeting between parties concerned. Westbound No-PDC levels for B462 and B438 to be agreed at this meeting also.***	Hong Kong, Sanya, Ho Chi Minh, Manila, Singapore	For L642 & M771 – NIL For N892 -Taipei ACC FL300, 340, 380 to correct level before KABAM For L625 - Fukuoka ACC FL320, 360, 400 To odd levels after MEVIN on B462, and Manila ACC will transition even flight levels into FL310, 350, 390 after AVMUP for flights entering Taipei FIR
L628	EB – FL330, 370, 410 WB – FL280, 340	Manila, Ho Chi Minh	NIL
N500	EB – FL330 WB – FL300	Manila, Ho Chi Minh	NIL
M765	EB – FL290, 370, WB – FL280, 340	Kuala Lumpur, Manila, Ho Chi Minh	NIL
M768	EB – FL270, 330, 410 WB – FL300, 380	Singapore, Ho Chi Minh, Kota Kinabalu	NIL
M753, M755	SB – FL270, 330 NB – FL300, 380	Singapore, Ho Chi Minh, Phnom Penh	NIL
L644	FL330, 410	Singapore, Ho Chi Minh	NIL
N891	EB – FL330, 390 WB – FL300, 380	Singapore, Ho Chi Minh	NIL
A1/P901	EB – FL290, 330, 370, 390, 410 WB - FL280, 300, 340, 380, 400	Hong Kong, Sanya, Ho Chi Minh, Bangkok, Vientiane	NIL

Route	Levels Listed are No-PDC Flight Levels. Other Levels available with prior approval	FIRs	Transition
A202	EB – FL290, 330, 370, 390, 410 WB - FL280, 300, 340, 380, 400	Hong Kong, Sanya, Hanoi, Bangkok, Vientianne	NIL
N884	FL310, 320, 350, 360, 390, 400	Singapore, Manila, Fukuoka	Manila ACC FL320, 360, 400 to odd levels prior to LBG New ATS route LBG-CAB-YURIX to be implemented
M767		Manila, Singapore	Manila ACC FL300, 340, 380 to odd levels after TOKON
A341	EB - FL310, 370 WB - FL320, 360, 400	Kota Kinabalu, Manila	NIL
M754	NB - FL300, 340, 380 SB – FL290, 330, 370, 410	Kota Kinabalu, Manila, Singapore	NIL
A461/R590/ B472/B473/ B462	EB – FL290, 330, 370, 410 WB - FL300, 340, 380	Manila, Ujung Pandang	NIL
A339	EB – FL310, 350, 390 WB – FL320, 360, 400	Ujung Pandang, Manila	NIL
G578	EB – FL350, 390 WB – FL320, 360, 400	Ujung Pandang, Manila	NIL
B583	EB- FL290, 330, 370, 410 WB- FL300, 340, 380	Kota Kinabalu. Ujung Pandang	NIL
B348	EB – FL310, 350, 390 WB- FL320, 360, 400	Kota Kinabalu, Manila	NIL
M772	FL 310, 390	Jakarta, Kota Kinabalu,	Kinabalu ACC prior to ASISU
M772	FL 300, 380	Manila, Singapore, Hong Kong,	NIL
B584	EB –FL310, 350, 390 WB – FL320, 340, 360	Kota Kinabalu, Ujung Padang	NIL
B462	EB- odd flight levels WB – FL300, 340, 380	Manila, Fukuoka	NIL
B348	EB – odd flight levels WB – FL300, 340 380	Manila, Taipei	NIL

Asia/Pacific Regional Airspace Safety Monitoring Advisory Group (RASMAG)

Reporting of RVSM Large Height Deviations

Since June 2007, RASMAG has adopted the following guidance for internal application by Asia/Pacific RVSM Regional Monitoring Agencies (RMAs) – The Monitoring Agency for the Asia Region (MAAR), the Pacific Approvals Registry and Monitoring Organization (PARMO), and the Australian RMA. RASMAG has agreed to make the RMA guidance widely available to States in order to assist States in verifying and concluding whether an observed incident should also be reported to the responsible RMA as a Large Height Deviation (LHD) in RVSM airspace.

RASMAG notes that LHD reporting does not take the place, in any way, of the normal ATS incident reporting requirements promulgated under respective State ATS Safety Management System requirements and considers that, in most cases, situations leading to a LHD occurrence would have already met the criteria for reporting as an ATS incident. Notwithstanding, supplementary reporting of LHD occurrences to Asia/Pacific RMAs in accordance with the published requirements of the RMAs is an essential part of the regional airspace safety monitoring requirements called for under Annex 11, paragraphs 3.3.5.1 & 3.3.5.2.

Definition of Large Height Deviation

Based on, amongst others, the *Guidance Material on the Implementation of a 300 M (1,000 ft) Vertical Separation Minimum (VSM) between FL290 and FL410 Inclusive for Application in the Airspace of the Asia Pacific Region* and discussions during the meeting, RASMAG has adopted the following plain language definition of a Large Height Deviation:

> ***A RVSM large height deviation (LHD) is defined as any vertical deviation of 90 metres/300 feet or more from the flight level expected to be occupied by the flight.***

Possible causes of Large Height Deviation

The causes of a LHD occurrence may include:

- Operational errors (aircraft operating at a flight level other than the assigned flight level due to ATC/Pilot loop errors and incorrect clearance), which are categorized into three causes:
  - Flight crew not following the correct ATC clearance
  - ATC issuing an incorrect ATC clearance
  - Receiving ATC unit unable to apply the separation standards during a transfer of control responsibility between two ATC units.

- Aircraft contingency events occurring in situation where the pilot cannot initially follow normal contingency procedures and is forced to climb/descend through flight levels before diverting from track,

- Deviation due to the effect of high level meteorological conditions, and/or

- Deviation due to Traffic Collision Avoidance System (TCAS) advisories, which includes:
  - Flight crew correctly following the TCAS Resolution Advisory (RA), ***[see note below],***
  - Flight crew incorrectly following the TCAS RA, and
  - Any vertical displacement not conforming to the resolution advisory.

Note: *LHD resulting from actions complying with a TCAS resolution advisory would not necessarily reflect risk in the RVSM airspace since it is a proper remedial action of flight crew. Nonetheless, it is strongly recommended that all LHD occurrences related to TCAS resolution advisory be reported to the responsible RMA for detailed airspace safety analysis.*

Categorization of LHD in RVSM Safety Monitoring Reports

In order to be consistent with the plain language LHD definition and associated guidance listing possible causes of LHD occurrences adopted by RASMAG in June 2007 (see above), revisions to the LHD categorizations applied by regional RMAs prior to June 2007 were necessary. Accordingly, RASMAG adopted the revised LHD categorizations described in Table 1 below for adoption by all RMAs serving the Asia/Pacific Region.

Code	RVSM Operations Large Height Deviation Categorization
Operational Errors	
A	flight crew failing to climb/descend the aircraft as cleared;
B	flight crew climbing/descending without ATC clearance;
C	Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearances etc);
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);
E	coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);
F	coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues;
Aircraft Contingency Events	
G	aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure);

Code	RVSM Operations Large Height Deviation Categorization
Operational Errors	
H	airborne equipment failure leading to unintentional or undetected change of flight level (e.g. altimetry errors);
Deviation due to Meteorological Condition	
I	turbulence or other weather related causes;
Deviation due to TCAS RA	
J	TCAS resolution advisory; flight crew correctly following the resolution advisory; ***Note:*** *LHD resulting from actions complying with a TCAS RA would not necessarily reflect risk in the RVSM airspace since it is a proper remedial action of flight crew. Nonetheless, it is strongly recommended that all LHD occurrences related to TCAS resolution advisory be reported to the responsible RMA for detailed airspace safety analysis.*
K	TCAS resolution advisory; flight crew incorrectly following the resolution advisory
Others	
L	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RSVM approval but aircraft not approved, ATC misinterpretation of flight plan)
M	Other

Table 1: Large Height Deviation Categorizations

WPAC/SCS RSG — TASK LIST

(last updated 15 June, 2007)

ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
1/2	States neighbouring the Philippines consider possible ways to undertake flight level transition tasks on behalf of Philippines.	WPAC/SCS RSG/3	Philippines, Neighbour States to Philippines	Open	
1/3	Urgently review and implement amended FLOS/FLAS arrangements at the Manila FIR/Taipei FIR/Fukuoka FIR boundary involving ATS routes L625, B462 and B348 in proximity to AGVAR, POTIB, MEVIN that are compatible with Scenario 3 FLOS/FLAS proposal.	WPAC/SCS RSG/3	States - Philippines, Japan, China (Taipei), WPAC/SCS RSG	Open	
1/4	Conduct traffic sampling to identify traffic loading on each of the ATS routes involved to enable prioritization of routes. Identify most frequent used flight levels on each route to enable underutilized flight levels to be reallocated to another route whilst considering the flight level requirements of ultra long range operations.	WPAC/SCS RSG/3	States	Open	
1/5	Consider introduction of additional parallel "crossing" ATS routes to enable bi-directional routes to be treated as uni-directional routes to increase capacity and availability of optimum flight levels	SEACG/15 then WPAC/SCS RSG/4	States	Open	Present proposals to SEACG/15 in May 2008
1/6	Review ATC coordination procedures and practices between ACCs to ensure procedures and/or practices do not contribute to LHD.	WPAC/SCS RSG/3	States	Open	WPAC/SCS RSG/2 reviewed actions taken so far, States to continue work in this area

ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
1/7	Review outstanding LHD data to ensure non-LHD are not being reported and submit remaining LHD reports to MAAR	July 2007	Jakarta, Ujung Pandang, Sanya, Vientiane, Hanoi, Ho Chi Minh	Open	
1/8	Provide update on LHD reports to WPAC/SCS RSG/3.	WPAC/SCS RSG/3	MAAR	Open	Present MAAR working paper to WPAC/SCS RSG/3
1/9	Prepare a "know your airspace" analysis of WPAC/SCS area for RSG/3 review.	WPAC/SCS RSG/3	MAAR	Open	
1/10	Update RSG/3 with arrangements for ACC Supervisor to ACC Supervisor coordination when LHD occurs.	WPAC/SCS RSG/3	States	Open	WPAC/SCS RSG/2 informed that LHD MOU implemented between Fukuoka ATMC, Naha ACC & Manila ACC, urged all States to consider implementing similar MOU.
1/13	Increase awareness of identified pilot contributory factors to LHD	Update WPAC/SCS RSG/3	States, IFALPA, IATA	Open	State reports of specific LHD occurrences identified as having pilot contributory factor to be provided to operators. IATA Singapore Office will assist to relay this information if required.
2/1	Conduct full review including Annex 11 compliant safety assessment of the Scenario 3 FLOS/FLAS agreed by WPAC/SCS RSG/3 with objective of implementing Scenario 3 FLOS/FLAS. Report results to next RSG meeting to enable WPAC/SCS RSG/3 to make 'Go/No Go' implementation decision.	Update WPAC/SCS RSG/3	States	Open	

ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
2/2	Conduct RMA safety assessment of the Scenario 3 FLOS/FLAS agreed by WPAC/SCS RSG/3 with objective of implementing Scenario 3 FLOS/FLAS. Report results to next RSG meeting to enable WPAC/SCS RSG/3 to make 'Go/No Go' implementation decision.	Update WPAC/SCS RSG/3	MAAR	Open	
2/3	Bring concerns raised by IFALPA in relation to loss of communications being included as LHD to the attention of RASMAG for review	RASMAG/8 December 2007	IFALPA, IATA, Secretariat	Open	
2/4	Consider implementation of MOU between States in relation to mutual reporting of LHD occurrences	Update WPAC/SCS RSG/3	States	Open	Use existing MOU between Fukuoka ATMC, Naha ACC & Manila ACC as the model
2/5	Include tick box question on MAAR standard LHD reporting template *'Were the Supervisors of the affected ACCs advised of this LHD occurrence'*	Update WPAC/SCS RSG/3	MAAR	Open	
2/6	Contact Lao PDR in relation to non-submission of LHD data	Update WPAC/SCS RSG/3	Thailand AEROTHAI	Open	
2/7	Arrange working group meeting between affected parties to finalise Scenario 3 transition arrangements on N892 and L625.	Update WPAC/SCS RSG/3	Japan to convene working group meeting	Open	

ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
2/8	In order to assist States to submit LHD reports, including 'NIL' reports, MAAR to send reminder Email prior to the periodic update of the safety assessment being conducted.	Update WPAC/SCS RSG/3	MAAR	Open	
2/9	Implement new ATS route LBG-CAB-YURIX adjoining N884 in Manila and Fukuoka FIRs	Update WPAC/SCS RSG/3	Philippines, Japan	Open	Regional Office to send letter to Philippines and Japan requesting assistance in implementing this route urgently.

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