INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

REPORT OF THE TWENTY-FOURTH MEETING OF THE ICAO REDUCED VERTICAL SEPARATION MINIMUM IMPLEMENTATION TASK FORCE (RVSM/TF/24)

BANGKOK, THAILAND

8 – 12 NOVEMBER 2004

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

Published by the ICAO Asia and Pacific Office, Bangkok

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1.1 Introduction

1.1.1 The Twenty-fourth Meeting of the Reduced Vertical Separation Minimum Implementation Task Force (RVSM/TF/24) was held at the Kotaite Wing of the ICAO Asia and Pacific Office, Bangkok, Thailand from 8 to 12 November 2004.

1.2 Attendance

1.2.1 The meeting was attended by 39 participants from Australia, Bangladesh, China, India, Malaysia, Myanmar, Nepal, Pakistan, Singapore, Sri Lanka, Thailand, United States, IATA and IFALPA. A complete list of participants is at **Appendix A**.

1.3 Officers and Secretariat

1.3.1 Mr. Sydney Maniam, Head (Air Traffic Services) Civil Aviation Authority of Singapore, continued as Chairman of the Task Force. Mr. David J. Moores, Regional Officer ATM served as the Secretary for the meeting. He was assisted by Mr. Andrew H. Tiede and Mr. Kyotaro Harano, Regional Officers ATM.

1.4 Opening of the Meeting

1.4.1 Mr. Sydney Maniam welcomed the participants and opened the RVSM/TF/24 meeting. He highlighted that the meeting was part of the ICAO implementation process, whereby a one-year review of RVSM implementation had to be conducted for the flight information regions (FIRs) in the area south of the Himalayas and over the Bay of Bengal and beyond (Bay of Bengal and Beyond) area. To this end, the meeting would have to identify any difficulties that had been encountered by ATS providers, as well as operators, with respect to RVSM operations in the respective areas. In addition, the meeting would have to review the safety assessments that had been completed by the Monitoring Agency for the Asia Region (MAAR) for the introduction of RVSM. The meeting would also be required to adopt a safety oversight programme which would facilitate the continued use of RVSM in the areas concerned.

1.4.2 Mr. Maniam pointed out that the implementation of RVSM had resulted in 6 additional flight levels being available to operators. However, due to the long haul nature of flights from Asia to Europe, only 2 or at most 3 levels were operationally viable. Hence, there was a need to optimize the use of RVSM levels. In this context, Malaysia, Singapore and Thailand had commenced an operational trial to utilize RVSM levels based on specific demands at departure airports. He urged the States concerned to review current arrangements on the assignment of RVSM levels and fine tune existing procedures as necessary.

1.4.3 Mr. Maniam stressed that there was an urgent need for provisions to be put in place to improve the overall management of traffic in the Bay of Bengal and Beyond area so that the full benefits of RVSM could be realized. To facilitate the process, the ICAO Regional Office had arranged for Airservices Australia and the Federal Aviation Administration (FAA) of the United States to conduct presentations on systems, which could be used to enhance air traffic flow management in the area. He requested participants to make time for the presentations to gain insights into the use and benefits of the systems.

1.4.4 Mr. Maniam reminded all participants that it was necessary to continue to cooperate and work closely in order for States and operators to continue to use RVSM in a safe and efficient manner.

1.4.5 Mr. David J. Moores on behalf of Mr. Lalit Shah, Regional Director of the ICAO Asia and Pacific Regional Office, welcomed the participants. He congratulated all parties involved for the outstanding results of the RVSM implementation project for the Bay of Bengal and Beyond area. The meeting marked an important stage in the planning and implementation process and after this meeting, RVSM follow-up activities would be taken up by the Bay of Bengal ATS Coordination Group (BBACG) and the Regional Airspace Safety Monitoring Advisory Group (RASMAG). He reminded States that an essential aspect of the RVSM programme was the establishment and ongoing operation of the Regional Monitoring Agency (RMA) operated by MAAR, a key element in the safety management programme. Now that the RVSM/TF work for the Bay of Bengal and Beyond was at an end, it was crucial that full support for MAAR was maintained. RVSM had led to substantial benefits in airspace capacity, efficiency, economy, and for the environment. It was gratifying that RVSM was now firmly established in nearly all the international airspace in the region.

1.5 **Documentation and Working Language**

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

1.5.2 Nine (9) Working Papers and three (3) Information Papers were presented to the meeting. A list of papers is included at **Appendix B**.

Agenda Item 1: Adoption of Proposed Agenda

1.1 The meeting adopted the agenda for the meeting. The agenda is at **Appendix C** to the Report.

Agenda Item 2: Operational Considerations

RVSM Implementation

2.1 The meeting undertook a review of RVSM implementation in the FIRs in Bay of Bengal and Beyond area on 27 November 2003. The States and international organizations provided an update on RVSM operations as outlined in the following paragraphs.

Bangladesh

2.2 Bangladesh reported that RVSM had been implemented successfully as planned. Initially, some difficulties were encountered with regard to the assignment of levels for eastbound flights which was to facilitate transition to China metric levels in Kunming FIR. These issues were subsequently resolved and RVSM operations were progressing well.

India

2.3 India informed that RVSM had been implemented successfully on 27 November 2003. Some operational issues were experienced with respect to levels that had been reserved for aircraft on international traffic flows. As a result, level assignment for domestic traffic was slightly restricted initially, which subsequently with increased confidence of the ATC managers was resolved by application of flexible level allocation for crossing traffic on international traffic flows. India also encountered difficulties in ensuring the 10-minute longitudinal separation between pairs of aircraft operating at FL 300 – FL 320, FL 340 – FL 360 and FL 380 – FL 400. Hence, there were occasions when re-routing of aircraft was unavoidable. This, to a large extent, was due to airspace constraints in the Kabul FIR where RVSM was not implemented.

2.4 India reported that from 26 March 2004, FL 280 was made available between 1930 UTC to 2230 UTC for traffic from Delhi FIR via TIGER and SAMAR. In addition, major changes to the ATS route structure had been completed over the last one year. These arrangements had resulted in reduction of ground delays at Delhi Airport and significant improvements to traffic flows. Details of the changes made are provided in paragraphs 2.22-2.24.

Malaysia

2.5 Malaysia reported that RVSM had been implemented successfully. In addition, the operational trial for a more flexible use of flight levels across the Bay of Bengal agreed with Singapore and Thailand was progressing well. However, arrangements for the release of FL 300 by Bangkok Area Control Center (ACC) had to be fine-tuned to further optimize the assignment of RVSM levels to westbound international flights from Kuala Lumpur and Singapore.

Myanmar

2.6 Myanmar informed that RVSM had been implemented successfully on 27 November 2003. The draft transition procedures with Kunming ACC had been finalized and would be incorporated in the Letter of Agreement (LOA) between the two ACCs. Myanmar also reported that in consultation with ICAO and Thailand, improvements to communication and surveillance

capabilities would be implemented in early 2005. This would include relocation of the ACC to a new operations building, installation of VSAT, improvement to VHF and HF radio equipment and expansion of the RCAG station network, as well as reactivation of the CPDLC and ADS trial.

Nepal

2.7 Nepal reported that RVSM was implemented successfully as planned on 27 November 2003. RVSM operations were progressing well and no major problems had been encountered.

Pakistan

2.8 Pakistan reported that RVSM was implemented on 27 November 2003. Overall, RVSM operations were progressing well and the management of traffic had improved significantly. Pakistan advised the meeting of a major failure of a satellite communication link on 12 September 2004 leading to the loss of VHF communications. As a result, RVSM operations were suspended from 1648 UTC until 0001 UTC on 13 September 2004 in the Karachi FIR. During the suspension period, coordination with adjacent ACCs was effected for the transition and the application of a conventional vertical separation minimum of 2 000 ft between aircraft.

Singapore

2.9 Singapore informed that initially the implementation of RVSM did not result in significant improvement to ground delays for westbound international departures to Europe. However, with the implementation of the operational trial with Malaysia and Thailand and the use of alternate ATS routes, e.g., P628, by airlines, the average ground delays had reduced from 18% to 13%. Singapore agreed with Malaysia that arrangements for the release of FL 300 by Bangkok ACC had to be fine-tuned to further optimize the assignment of RVSM levels to westbound international flights to Europe.

Sri Lanka

2.10 Sri Lanka reported that RVSM was implemented successfully on 27 November 2003. RVSM operations were progressing well and the overall management of traffic had improved significantly.

Thailand

2.11 Thailand reported that RVSM was introduced successfully on 27 November 2003. Overall, traffic capacity had increased and operations were progressing in a stable mode. Thailand informed that the operational trial with Malaysia and Singapore was on-going. In addition, CPDLC and ADS trials had commenced on 5 November 2004 to enhance communication and surveillance capabilities in Bangkok FIR. Thailand proposed that existing coordination procedures with Malaysia, Myanmar and Singapore be improved to facilitate the use of all RVSM levels during peak traffic periods and further enhance the management of traffic.

IATA

2.12 IATA commended the States concerned for their efforts in implementing RVSM in the Bay of Bengal and Beyond area. Overall, there had been significant improvements in operations as a result of the availability of additional levels. IATA highlighted the need for an air traffic flow management (ATFM) plan to further ease congestion and ground delays experienced by westbound international departures to Europe. The ATFM plan is discussed further under Agenda Item 6.

IFALPA

2.13 IFALPA complimented the States involved in RVSM implementation in the Bay of Bengal and Beyond area and thanked them for their efforts. Overall, RVSM operations were progressing well. IFALPA pointed out that there had been some communication difficulties experienced in the Yangon FIR and in the Port Blair area on frequencies 124.55 MHz, 5658 KHz and 3467 KHz.

Assignment of RVSM Levels

2.14 The meeting reviewed the current operational trial that was implemented by Malaysia, Singapore, and Thailand on the assignment of RVSM levels for westbound international flights. Based on the existing No-Pre-Departure Coordination (No-PDC) procedures, FL 280, FL 320 and FL 340 were assigned to aircraft planned on the parallel routes over the Bay of Bengal, and FL 300 to aircraft on crossing routes. Malaysia, Singapore and Thailand had been coordinating daily to assign levels based on actual traffic demand. The meeting noted that there had been no significant improvement to the traffic situation as ground delays were still encountered by airlines at departure airports in the above States during the night peak period for the westbound traffic flow to Europe and the Middle East. Malaysia, Singapore, and Thailand reviewed existing coordination procedures to facilitate flexible use of all levels based on traffic demand.

2.15 IATA stressed that the full utilization of all available flight levels and slots was crucial to reducing ground delays and to enable operators to obtain optimum levels as soon as practicable. The impact of the present unprecedented aviation fuel costs on airline operations was of the highest priority for operators. Therefore, improvements to the efficiency of air traffic operations were urgently required. The meeting recognized the concerns of the operators and efforts were being made to address this problem. The latest coordination procedures agreed by the ATS providers concerned were expected to lead to improvements.

2.16 The meeting requested IATA to monitor the situation and provide the States concerned with an update over the next 2 months. The meeting also agreed to refer this matter to the next BBACG meeting for further action.

Phraseologies for RVSM Operations

2.17 The meeting noted that the ICAO Air Navigation Commission (ANC) reviewed proposed Amendment 3 to the *Procedures of Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444). The proposed amendment related to, *inter alia,* phraseologies concerning RVSM. The meeting recognized that the ANC had approved the amendment for applicability on 25 November 2004. Consequently, the amendment was approved on 29 June 2004 by the President of the Council on behalf of the Council in accordance with established procedures.

2.18 The meeting was advised that the phraseologies related to RVSM operations and they had been developed by various RVSM meetings in different regions. In the Asia/Pacific Region, this Task Force adopted the phraseologies at its 12th meeting (September 2001, Denpasar), which followed those developed by EUROCONTROL, and included the phraseologies in a draft AIP supplement to be published by States. The manner in which the phraseologies were provided varied from region to region e.g., in Europe, the phraseologies were provided in the *Regional Supplementary Procedures* (SUPPs), and in the Asia/Pacific Region, this Task Force adopted them and States were encouraged to publish them in their AIPs.

2.19 In light of the above, ICAO Headquarters, Montreal undertook a review of the phraseologies and developed the amendment proposal to the PANS-ATM for global applicability.

2.20 As a consequence of the above, State Letter AN 13/2.1-04/72 was issued on 30 July 2004 containing Amendment 3 to the PANS-ATM with an effective date of 25 November 2004 (**Appendix D** to the Report refers).

2.21 States were urged to adopt these phraseologies and to update their ATC operating manuals and AIPs, where required, as a matter of priority.

New Route Development in Indian FIRs

2.22 The meeting noted that during the last one-year some very significant changes had been carried out on the ATS route structure in India FIRs, viz:

a) ATS Route M 890 had been established as a by-pass route of the Delhi TMA, providing an alternate route 17 NM shorter than R460W-A466W between Lucknow 'LLK' VOR and SAMAR;

b) ATS route UM551 had been implemented to provide a shorter route between Trivandrum and Salalah across the Arabian Sea, resulting in a saving of about 103 NM between waypoint DONSA and Salalah Airport in the Sultanate of Oman;

c) ATS route W107 had been established to provide a direct route, 61 NM shorter, for flights operating between Chennai and Hong Kong via Port Blair 'PPB'VOR;

d) ATS Route P628 had been extended beyond ASOPO to Rahim Yar Khan 'RK' VOR in consultation with Defense Authorities;

e) the lower limit of L333 was changed from FL 310 to FL 300 on 27 November 2003; and

f) further efforts were continuing to shorten or straighten some more international ATS routes passing through Indian airspace. For example Kathmandu – Kunming route via the northeastern part of Indian airspace, had since been approved by India. The Civil Aviation Authority of Nepal was coordinating with other ATS providers for the remaining portion of the route.

2.23 As brought out by India, the meeting noted that available capacity on certain international ATS routes was still underutilized and a few international flights operate on those routes. Airlines were invited to flight plan via ATS Routes P628 and N877 to make more use of these routes, as originally envisaged by the EMARRSH Task Force. It was suggested by India that airlines should fly these routes on experimental basis and the States concerned to evaluate whether delays on the ground were reduced by the spread of westbound traffic on all routes. The increased fuel consumption for westbound aircraft flying via slightly longer routes may perhaps be offset by the fuel saving by flying shorter routes now provided for eastbound flights. Additionally, a considerably higher tailwind component for the eastbound flights on the shorter routes would give extra time and fuel savings to the participating airlines.

2.24 In general, the airspace below the boundaries of RVSM, RNAV and RNP airspace was not normally occupied by medium and long-range international flights. Considering the specific requirements of traffic operating between Hong Kong − Johannesburg, Kuala Lumpur – Colombo, Bangkok – Middle East, the lower limit of certain ATS routes had been kept at FL 260. Two conventional ATS routes, namely G472 and B466, also had been kept operational by India to cater for

flights unable to operate in the higher level bands but still needed to plan their flights to cross the Bay of Bengal.

Agenda Item 3: Airworthiness and Aircraft Operations Issues

Global RVSM Aircraft Approval Registry

3.1 The meeting noted the responsibility of MAAR to establish and maintain a central registry of State RVSM operational approvals of operators and aircraft as required by RVSM implementation documentation. The RASMAG/2 meeting (October 2004) noted this problem and States had been requested to provide RVSM approval records of all registered aircraft.

3.2 The meeting recalled that the registry forms part of the Global RVSM Aircraft Approval Registry Database and would assist States to verify the RVSM approval status of aircraft operating in their areas. MAAR requested States concerned to provide monthly updates on RVSM approvals issued, no later than the 15th day of the following month. Complete details of RVSM approval registry records were available on the MAAR website (www.aerothai.co.th/maar). The ICAO Regional Office agreed to send a reminder to all States requesting them to follow up as necessary.

Continuous Monitoring Program

3.3 India expressed the need for follow-up on the height keeping-performance of RVSM approved aircraft to ensure safety of aircraft operations in the RVSM environment, and sought clarification on the modalities to be adopted. MAAR explained that the procedures for the Continuous Monitoring Program were being finalized by the Separation and Airspace Safety Panel (SASP). MAAR would adopt the finalized procedures and notify States concerned in due course. It was further noted that ICAO had not established a global long term monitoring policy and this was being examined by SASP.

3.4 In regard to the minimum monitoring requirement (MMR) for the Asia/Pacific Region, the ICAO RMA Handbook, shortly to be published, would provide guidance. The Pacific Approval Registry and Monitoring Organization (PARMO) had adopted an MMR similar to that in the RMA Handbook, and the RASMAG/1 meeting agreed that the PARMO MMR should be the MMR for the region. The meeting agreed that the ASIA/PAC RMAs should coordinate and agree on the MMR to be adopted in line with the handbook. The meeting was advised by the Secretariat that the APANPIRG/15 meeting (August 2004) had appointed Airservices Australia as the RMA for Australian airspace not covered by PARMO. It was pointed out that some variation in the MMR could arise regionally in respect to the aircraft types placed in the various groups. But it was not expected that there would be significant variations to the number of aircraft required to be monitored.

Agenda Item 4: Safety and Airspace Monitoring

Review Safety Assessment of RVSM Operations in the Bay of Bengal and Beyond Area

4.1 MAAR presented the annual report of airspace safety review of RVSM implementation and operations in the Bay of Bengal and Beyond area which involved 15 FIRs. The review was conducted based on a one-month traffic sample data collected during July 2004.

4.2 The meeting reviewed the completion of the traffic data collected between 1 and 31 July 2004 as summarized in **Table 3-2** in the MAAR report as shown below. The meeting noted that

not all States had provided suitable traffic sample data for analysis and the overall results of the analysis would therefore have to be updated when this data became available.

States	FIR Name	Status	Remarks
Bangladesh	Dhaka	No data received	-
India	Chennai	Received	Data completed
	Delhi	Received	Data completed
	Kolkata	Received	Data completed
	Mumbai	Received	Data completed
Indonesia	Jakarta	No data received	-
Malaysia	Kuala Lumpur	Received	Data completed
Maldives	Male	Received	Data completed
Myanmar	Yangon	No data received	-
Nepal	Katmandu	No data received	-
Pakistan	Karachi	Received	Data completed
	Lahore	Received	Missing data on 5 July 2004
Singapore	Singapore	Received	Data completed
Sri Lanka	Colombo	No data received	-
Thailand	Bangkok	Received	Data completed

Table 3-2: Summary of Traffic Data of July 2004 Received by MAAR for the Bay of Bengal and Beyond Area

4.3 Based on the available traffic data, the number of flights in the traffic data was broken down into various categories and summarized as follows:

- daily flights operating in the FIR;
- top-50 State pairs, based on FIR-flights (charts showed for each State pair, traffic in both direction);
- top-50 city pairs, based on FIR-flights (chart showed for each city, traffic in both directions);
- top-50 commercial operators, in terms of total FIR-flights between FL 290 to FL 410 inclusive (these operators represent over 90% of the operations observed in the sample);

- aircraft types observed in the various FIR samples were combined into aircraft groups (the number of FIR-flights of the top-50 aircraft group were depicted); and

- flight level utilization in the RVSM airspace between FL 290 to FL 410 inclusive was depicted.

4.4 The meeting took note of the report on the summary of the Large Height Deviation (LHD) occurrences in Bay of Bengal and Beyond area between January 2003 and September 2004. The summary of LHD reports submitted by the concerned States in the Bay of Bengal and Beyond area are provided in **Table 6-1** of the MAAR report as shown below:

States	FIR Name	Received		Remarks/ Missing Report
		From	To	
Bangladesh	Dhaka	Jan 03	Sep 04	
India	Chennai	Jan 03	Jul 04	Missing reports: Aug 04 to present
	Delhi			
	Kolkata			
	Mumbai			
Indonesia	Jakarta	Jan 03	Jan 04	Missing reports: Feb 04 to present
Malaysia	Kuala Lumpur	Jan 03	Sep 04	
Maldives	Male	Jan 03	Sep 04	
Myanmar	Yangon	Jan 03	May 04	Missing reports: Jun 04 to present
Nepal	Katmandu	Jan 03	Jul 04	
Pakistan	Karachi	Jan 03	Oct 04	
	Lahore	Jan 03	Oct 04	
Singapore	Singapore	Jan 03	Sep 04	
Sri Lanka	Colombo	Jan 03	Jun 04	Missing reports: Jul 04 to present
Thailand	Bangkok	Jan 03	Oct 04	

Table6-1: Summary of LHD Reports Received by MAAR since January 2003 for Bay of Bengal and Beyond Area

4.5 Based on the received LHD reports, the meeting reviewed the number of LHD occurrences and the associated LHD duration in minutes in the Bay of Bengal and Beyond area for each month between January 2003 and September 2004, as shown in **Figure 6-1** of the MAAR report shown below. In summary, there were **11 LHD occurrences** in the Bay of Bengal and Beyond area**,** which accounted for **35 minutes of operational errors since January 2003**.

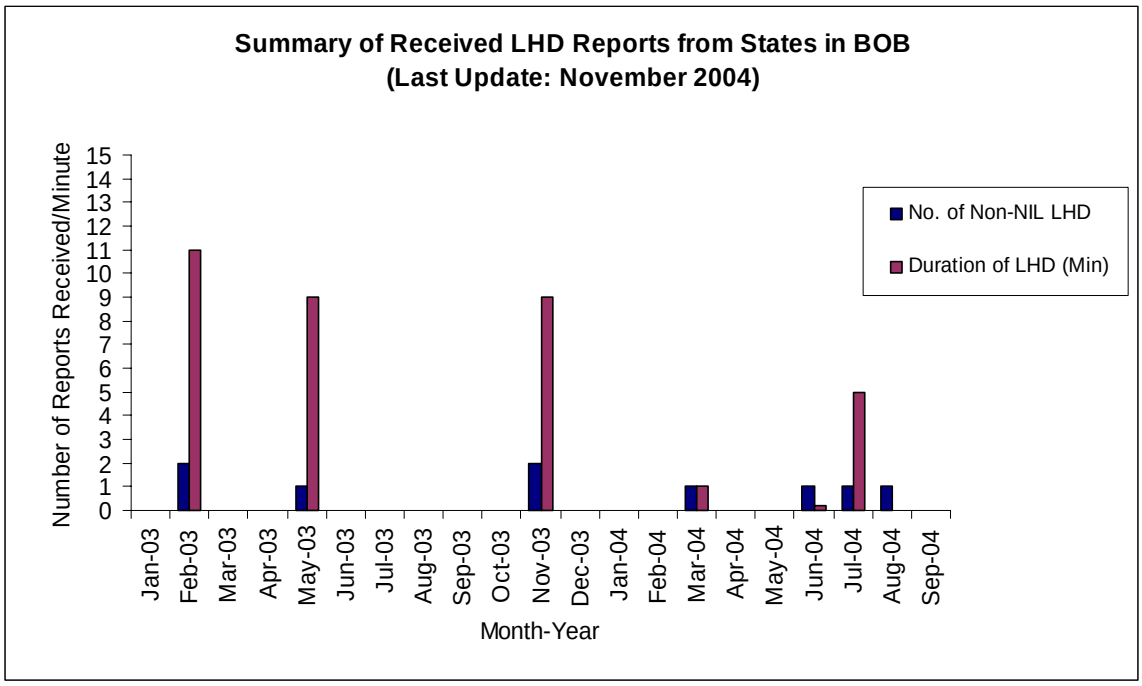

Figure 6-1: Summary of LHD Occurrences in RVSM Airspace of Bay of Bengal and Beyond Area

4.6 The meeting also reviewed the cause of LHD occurrences reported to MAAR as recorded in **Figure 6-2** of the MAAR report as shown below. The meeting noted that causes of LHD occurrences were determined by the primary cause of deviation and also noted that all of the LHD occurrences were attributable to operational errors. Figure 6-2 summarizes the number of LHD occurrences by the causes of deviation, using the letter-coding scheme of **Table 6-2** in the MAAR report and reproduced below:

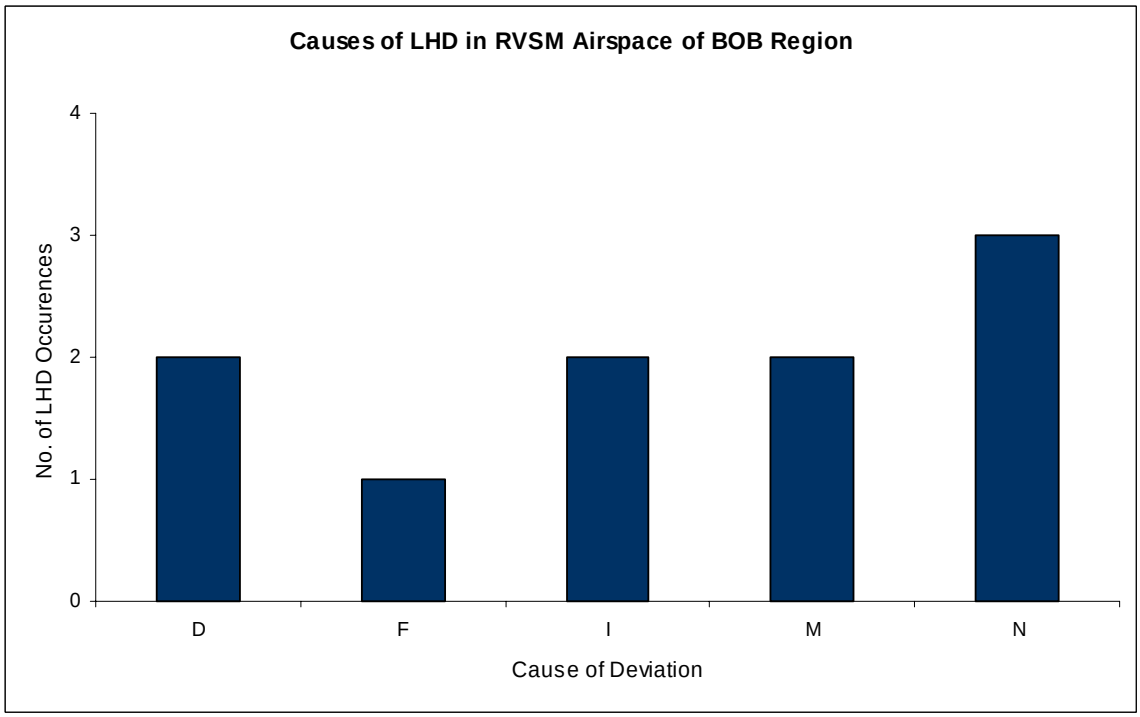

Figure 6-2: Causes of LHD Occurrences in RVSM Airspace of Bay of Bengal and Beyond Area

Code	Cause of Large Height Deviation
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	Other

Table 6-2: Codes Defining Causes of LHD Reports

4.7 In light of the information provided, the meeting noted that the number of LHD occurrences and erroneous duration were considered to be relatively small.

4.8 Based on the collision risk estimates in the Traffic Sample Data (TSD) and LHD reports submitted to MAAR, the technical and operational risks for the RVSM implementation in the Bay of Bengal and Beyond area is 5.59 x 10^{-10} and 1.37 x 10^{-9} fatal accidents per flight hour, respectively, as shown in **Table 7-5** in the MAAR report shown below. Thus, the total risk attributed to all causes is 1.93 x 10^{-9}. **Figure 7-1** of the MAAR report shown below presents the trends of collision risk estimates for each month using the appropriate 12-month interval of LHD reports received by MAAR. The estimates of both technical and total risks from the available TSD and LHD reports satisfy the agreed Target Level of Safety (TLS) value of no more than 2.5 x 10^{-9} and 5.0 x 10^{-9} fatal accidents per flight hour due to the loss of a correctly established vertical separation standard of 1,000 ft and to all causes, respectively.

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	5.59 x 10^{-10}	2.5 x 10^{-9}	Below Technical TLS
Operational Risk	1.37 x 10^{-9}	-	-
Total Risk	1.93 x 10^{-9}	5.0 x 10^{-9}	Below Overall TLS

Table 7-5: Risk Estimates for the RVSM Implementation in Bay of Bengal and Beyond Area

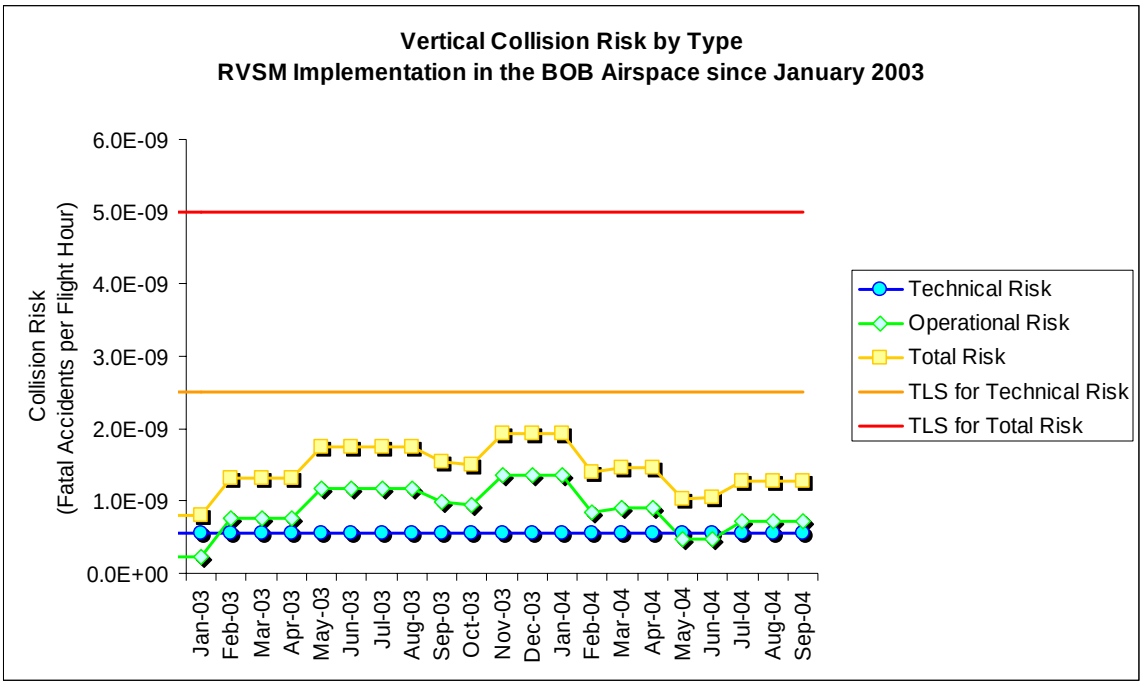

Figure 7-1: Trends of Risk Estimates for the RVSM Implementation in Bay of Bengal and Beyond Area

Complete Safety Monitoring Arrangements for RVSM Operations in Bay of Bengal and Beyond Area

4.9 The meeting was pleased to note that the results of the risk calculations were well within the TLS. However, there were a number of disturbing issues that had been identified by MAAR that required urgent follow up:

- missing TSD;
- missing LHD reports;
- incomplete and non-reporting of State approvals registry data; and
- incomplete information on follow-up monitoring of aircraft height-keeping performance in accordance with the MMR.

4.10 The meeting was concerned that some States had failed to fulfill their obligations towards ICAO safety requirements for ongoing operation of RVSM. The periodic review and updating of the safety assessments for RVSM airspaces was an essential part of RVSM operations, along with the maintenance of the regional and global records of States' aircraft and operator RVSM approvals. The provision of monthly LHD reports, including "NIL reports" where applicable, was essential for determining operational errors that impact on RVSM safety. The absence or incompleteness of such data denigrates the integrity of the safety assessment results.

4.11 In light of the above, the meeting agreed that, in view of the incomplete safety assessment for those FIRs concerned, it was urgent that the States involved be informed that the safety data must be submitted to MAAR as soon as possible. Without the safety assessment verifying that the TLS was being met, the safety of RVSM operations could not be assured. In this regard, the meeting noted that the RASMAG/2 meeting had requested the Regional Office to inform the States involved to submit the data to MAAR as a matter of urgency. The Secretariat confirmed that action

was being taken. In addition, a mission was under preparation to one of the States concerned and these issues would be raised.

Report of the RASMAG/2 meeting

4.12 The meeting reviewed the summary of the Report of the RASMAG/2 meeting in respect to RVSM matters, which was held from 4 to 8 October 2004 at Bangkok. The meeting noted that RASMAG was required to review the reports of the Asia/Pacific safety monitoring agencies and submit a consolidated report to APANPIRG. At the RASMAG/2 meeting, the reports of the RMAs operated by Airservices Australia, MAAR and PARMO were reviewed.

4.13 The meeting recalled that one of the duties of the RMAs was to regularly circulate to all parties concerned reports reviewing RVSM-related performance in affected FIRs relative to the established safety goals. The RASMAG/2 meeting had agreed that the RMAs would conduct an annual update of the RVSM safety assessments based on TSD for the month of December. The meeting noted that the RASMAG/2 meeting had not indicated a date when this assessment should be completed and this needed to be clarified.

4.14 The meeting noted that the RASMAG/1 meeting had recommended to the APANPIRG/15 meeting that Airservices Australia should be appointed as an RMA and Safety Monitoring Agency (SMA), and this had been agreed.

4.15 The RASMAG/2 meeting had also addressed the problem brought to the attention of the meeting by MAAR concerning States not submitting data required for the safety assessment in a timely manner. This had also been experienced by PARMO and the Pacific States concerned would also be included in the letter to be issued by the Regional Office.

Agenda Item 5: Implementation Management Considerations

Transition Arrangement between Kunming and Yangon FIRs

5.1 The meeting noted that the transition procedure arrangement between Kunming and Yangon ACCs was being revised. China and Myanmar had been coordinating improvements to the transition procedures between the China Metric levels operating in the Kunming FIR and the ICAO RVSM levels operating in the Yangon FIR.

5.2 The meeting recalled that revised transition procedures had been discussed between China and Myanmar in line with a proposal presented by the RVSM Task Force since the implementation of RVSM in Bay of Bengal and Beyond area in November 2003. Following agreement between China and Myanmar representatives at this meeting, an LOA would be signed with effect on 1601 UTC, 20 January 2005. The draft LOA is attached as **Appendix E** to the Report.

5.3 IATA expressed appreciation to the States concerned for modifying the transition procedures, which would remove the double transition, and simplify the procedure and improve efficiency. In addition, IATA reminded the meeting that Myanmar should issue a NOTAM and revise the no communication procedures relating to the transition procedures.

5.4 Myanmar noted the request and agreed to review and publish revised no communication procedures as appropriate.

5.5 IATA drew attention to the complicated radio communication procedures in the Dhaka, Kolkata and Yangon FIRs requiring pilots to report to the three ACCs simultaneously as well as reporting under the IATA Flight Broadcast Procedure in effect in the Yangon FIR. IATA

requested that this matter should be reviewed by the States concerned to alleviate unnecessary workload on flight crews. The Secretary advised the meeting that the Regional Office was presently undertaking missions to the States concerned and this matter would be addressed.

ATFM Plan

5.6 The meeting recalled that at previous Task Force meetings and other ATS coordination meetings, it had been recognized that the EMARSSH routes implemented on 28 November 2002 did not provide the anticipated benefits because the full phase II programme as originally agreed to by States could not be implemented. In this regard, the meeting recalled that the problem was primarily due to only two independent traffic flows, i.e., via TIGER or SAMAR, being available instead of the anticipated four independent Asia – Europe flows across the northern half of the Bay of Bengal and through India, Pakistan, and Afghanistan.

5.7 The meeting also noted that the implementation of RVSM in November 2003 had improved the availability of levels over the Bay of Bengal and Indian sub-continent, particularly the higher levels above FL 320. However, the long haul flights to Europe from Southeast Asia airports, (mainly Bangkok, Kuala Lumpur and Singapore), which were weight and performance restricted, could not operate at these higher levels. It was noted that the long haul flights operated at the lower levels, i.e., FL 280, FL 300, and FL 320, during the first 3-4 hours of the flight. As FL 300 was usually occupied by westbound flights on routes crossing P628, L750 and M770 under the No-PDC arrangement, only two levels were routinely available.

5.8 Also, the meeting noted that due to constraints in the Lahore FIR, which was a transition area for the non-RVSM Afghanistan airspace, this caused a “bottleneck”, which had a major impact on availability of levels. IATA drew attention to the present air traffic arrangements, which in their view did not make maximum use of available capacity. In particular, as N644 and A466 diverged from Dera Ismail Khan (DI) VOR, it should be possible to accommodate more traffic than at present, whereby only three aircraft at a time were permitted subject to no more than two aircraft being on the same route. Furthermore, as both routes were within radar coverage, better use should be made of providing lateral separation between the aircraft that diverge after DI. However, these two routes were still being treated as one single route, effectively halving the available capacity. The meeting recognized this problem and requested that Pakistan and other parties concerned to review the arrangements.

5.9 The meeting was advised by Pakistan that as a result of implementation of the route segment RK VOR − KANDAHAR on G792 on 1 November 2004 (available from 1901 UTC to 2359 UTC), a third parallel route via P628 was now available and this should provide additional capacity and relieve congestion on the other routes. IATA congratulated the ICAO Regional Offices, India, Pakistan and the Afghan authorities for their efforts in opening this important segment. It was anticipated that operators would now start to flight plan on this routing. The meeting requested the Regional Office to obtain confirmation from the Coalition Force Air Component Command (CFACC, military authority responsible for Afghanistan airspace) that a NOTAM has been issued for the implementation of G792 within the Kabul FIR.

Agenda Item 6: Any Other Business

Review of Action Items

6.1 The meeting reviewed the completion of tasks relating to the implementation of RVSM in the Bay of Bengal and Beyond area, based on the list that had been developed by the ICAO RVSM Implementation Task Force. All the tasks were successfully completed and closed as shown in **Appendix F** to the Report.

Air Traffic Flow Management in the Bay of Bengal and Beyond Area

6.2 The meeting considered the ongoing problems surrounding the implementation of effective ATFM in the Bay of Bengal and Beyond area, noting that as well as the RVSM Task Force and BBACG meetings that had considered the issue, several special coordination meetings had taken place over the past two years in an effort to develop an ATFM system or traffic orientation scheme to overcome these serious problems.

6.3 The meeting was informed that the APANPIRG/15 meeting had noted the considerable efforts being made by States to collaborate together and with IATA and the airlines to improve the ATFM over the Bay of Bengal and Beyond area. It was recognized that considerable constraints on the airspace were beyond the control of the States concerned. However the APANPIRG/15 meeting encouraged all parties to continue their efforts and to take into account the benefits to be derived from ATM automated systems.

6.4 In regard to the complex traffic flows into the Kabul FIR resulting from the lack of an ATFM plan, IATA demonstrated to the meeting that although the restrictions in the Kabul FIR acted as a severe choke on traffic flow, there was sufficient airspace capacity available and the application of suitable flow management measures prior to the traffic reaching the Kabul FIR would allow the maximum possible flow rate to be achieved through Afghanistan. IATA summarized the traffic forecasts for Asia, noting the substantial general increases expected in the near term and the explosive growth anticipated for the Indian sub-continent in particular.

6.5 During the BBACG/15 meeting (September 2004) IATA had presented a brief summary of two automated flow management systems, the *Dynamic Ocean Track System Plus (DOTS+)* used by the FAA and the *SKYFLOW* system used by Airservices Australia. The BBACG/15 meeting had agreed that further work should be undertaken with a view to formulating a regional ATFM plan as soon as practicable, and agreed that the material presented by IATA utilizing automated flow management applications warranted further study. Accordingly, the Regional Office had invited representatives from the FAA and Airservices Australia to provide technical presentations to the RVSM/TF/24 meeting regarding the two systems referred to above.

US FAA Dynamic Ocean Track System Plus (DOTS+)

6.6 An FAA representative briefed the meeting regarding the DOTS+ automated flow management system. DOTS+ and its Online Track Advisory service has been in operational use in the United States for more than 10 years and could be readily modified to manage the westbound departures across the Bay of Bengal. DOTS+ would do this by designating metered gateway fixes for each traffic flow on the westbound tracks of Bay of Bengal and Beyond area. Aircraft operators would submit gateway requests, which included track selection, requested altitude and an ETA at the gateway fix for each flight (with a provision to submit up to 8 choices) via the Internet or AFTN for each departure to Europe. DOTS+ would then create a gateway reservation list that would take into account any constraints like flow and altitude restrictions for each track. The system would be flexible, able to accept changes at many stages through the process, and could be set at whatever flow rate (e.g. 10 minutes, 12 minutes) was desired at the gateway fixes. This system developed by the FAA could be owned and operated by a State ATS provider(s) or by IATA and its member airlines, and the software provided by the FAA under a licensing arrangement.

6.7 In practice, the system would need to be self policing, requiring the cooperative participation of all users. In the United States, operators that did not use the system correctly were afforded a lower priority, being accommodated only after the remaining users had been processed. DOTS+ also has comprehensive reporting capabilities, allowing (for example) the identification of operators that book multiple slots they did not use. Consequently, there was significant incentive for

operators to use the system correctly. Copies of the DOTS+ presentation are included as **Appendix G and Appendix H** to the Report.

6.8 The meeting expressed its appreciation to ICAO, IATA and the FAA for the presentation on the DOTS+.

Airservices Australia's SKYFLOW

6.9 Airservices Australia gave a presentation regarding general flow control techniques and their Central Traffic Management System (CTMS) that was being used to manage traffic into Sydney, using software called SKYFLOW developed in-house by Airservices Australia. The meeting was informed of how this system could be modified to manage departures that operate across the Bay of Bengal and Beyond area.

6.10 In simplified terms, the system would operate as follows:

- airline schedules would be loaded daily via the Internet;
- a series of defined gateway fixes would be established in Afghanistan airspace;
- capacity at gateways would be decided by ATC;
- a programme would be run and results made available by agreed time;
- information would be sent to stakeholders via chosen predetermined means (internet, fax, etc.);
- flight planning would be submitted based on the final programmed time;
- flights would depart on the programmed time; and
- tactical control would still be required for final management.

6.11 Airservices Australia advised that, pursuant to a business decision taken in recent weeks, they had elected to remove the CTMS/SKYFLOW system from further consideration as an alternative ATFM system tool for deployment in the Bay of Bengal and Beyond area. The Airservices Australia presentation is included as **Appendix I** to the Report.

6.12 The meeting expressed its appreciation to Airservices Australia for the informative presentation on the CTMS/SKYFLOW.

ATFM Plan

6.13 The meeting recognized the need for improvements to be made to the overall management of traffic in the Bay of Bengal and Beyond area. The meeting also noted that the DOTS+ or a similar system, could be used to streamline the flow of traffic, alleviate congestion, and consequently reduce ground delays at international airports. The meeting agreed that a Special Coordination Meeting (SCM) should be convened to study the matter in greater detail, taking into account current operational requirements and future increases in traffic flows. In addition, the meeting considered that an operational trial should be conducted to enable the States concerned to assess the effectiveness of the system and the corresponding ATFM plan. To this end, the meeting agreed that the SCM should report its findings and recommendations to the next ATM/AIS/SAR Sub-Group meeting (4-8 July 2005) for endorsement by APANPIRG/16. The ICAO Regional Office would liaise with the States concerned and arrange for the SCM in early 2005.

6.14 The meeting was of the view that consideration should be given to wider application of ATFM automated tools, as traffic growth would necessitate operating ATFM in other areas in the region. In this regard, the meeting noted that a gate-to-gate approach must be adopted and that en-route operations should not be taken into account in isolation from terminal and airport operations. Australia advised the meeting that at the next Informal South Pacific ATC Coordinating Group (ISPACG/19) meeting in February/March 2005, specialists on terminal and airport operations had been invited to participate, in recognition of the importance of adopting a gate-to-gate approach to flow management. The meeting agreed that a Task Force should be set up under the ATM/AIS/SAR/SG as this would facilitate broader consideration under the purview of APANPIRG.

6.15 The Secretariat suggested that States should indicate their willingness to make a long term commitment to supporting such an effort. Accordingly, the first step should be to seek this commitment from States, as the setting up of a Task Force would not be feasible without this assurance. Further, the meeting agreed that ATM/AIS/SAR/SG/16 should be requested to undertake this task and APANPIRG would also need to endorse this plan. The Secretariat agreed to present the outcome of the SCM to the ATM/AIS/SAR/SG/16 to take appropriate follow-up action.

Civil/Military Coordination

6.16 India reported that coordination efforts had been made with their military authority. At the RVSM/TF/23 meeting (October 2004), a State expressed concerns over unidentified aircraft flying in an RVSM airspace without authorization. At this meeting, concerns over the approval process and approval registry of military aircraft for RVSM operation were expressed.

6.17 In light of the above, the meeting noted the importance of close coordination between civil aviation and military authorities. The Secretary advised that a Civil/Military Coordination Seminar would be held from 14 to 17 December 2004 at the Regional Office, and this issue would be addressed at that seminar.

Agenda Item 7: Future Work

7.1 The meeting agreed to declare full RVSM operational capability for the Bay of Bengal and Beyond area since RVSM operations were progressing well. The meeting also agreed that the outstanding issues relating to RVSM operations in the Bay of Bengal and Beyond area should be completed bi-laterally by the States concerned, in consultation with the ICAO Regional Office and IATA. Also, BBCAG, RASMAG and ATM/AIS/SAR/SG would continue to address relevant RVSM issues and take appropriate follow-up action.

8. Closing of Meeting

8.1 In closing the meeting, Mr. Maniam thanked participants for their contribution and especially the FAA and Airservices Australia for the excellent presentations, which had greatly contributed to a better understanding of ATFM. As this was the last meeting of the RVSM Task Force on the Bay of Bengal and Beyond implementation project, he congratulated all parties involved for the outstanding accomplishment in implementing RVSM and continued successful operations.

8.2 The meeting had identified some areas of concern but these matters would be addressed by ICAO and should be rectified in due course. The question of air traffic flow management and the efficiency of air traffic operations had been thoroughly discussed, and the outcomes were encouraging. In addition, the establishment of an air traffic flow management system for the Bay of Bengal had moved a step forward.

8.3 The Secretariat thanked participants and the Chairperson for having achieved a very successful outcome to this meeting, which demonstrated the excellent spirit of cooperation that has marked all the RVSM/TF meetings. The way forward for future work on the Bay of Bengal air traffic arrangements was a positive outcome.

8.4 The meeting expressed appreciation to MAAR for the excellent and detailed work, and support they provided for the RVSM implementation and ongoing operations.

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

NUMBER	AGENDA	WORKING PAPERS	PRESENTED BY
WP/1	1	Provisional Agenda	Chairman
WP/2		WITHDRAWN	
WP/3	6	Implementation of the Reduced Vertical Separation Minimum (RVSM) in Bay of Bengal and Beyond	Secretariat
WP/4	8	New Provisions Concerning RVSM Phraseologies in the PANS-ATM	Secretariat
WP/5	2	RVSM Implementation in Indian FIRs	India
WP/6	4	Summary of the Airspace Safety Review for the RVSM Implementation in Asia Region – Bay of Bengal Airspace	MAAR
WP/7	4	Summary of the Second Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/2)	Secretariat
WP/8	5	Transition Arrangement between Kunming and Yangon ACCs	Secretariat
WP/9	5	Reducing Delays and Congestion Problems for Long Haul Westbound Flights	IATA

NUMBER	AGENDA	INFORMATION PAPERS	PRESENTED BY
IP/1	-	List of Working Papers (WPs) and Information Papers (IPs)	Secretariat
IP/2	2	Review of the Outcomes of the Twenty-second Meeting of the ICAO RVSM Task Force on the Operation of Different RVSM Flight Level Orientation Schemes in the Asia/Pacific Region	Secretariat
IP/3	2	Update on RVSM Operations in Kuala Lumpur FIR	Malaysia

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AGENDA

Agenda Item 1: Adoption of proposed agenda

Agenda Item 2: Operational Considerations

- Review RVSM operations in Bay of Bengal and Beyond
- Identify and address difficulties (if any) encountered by ATS providers and operators
- Transition issue

Agenda Item 3: Airworthiness and Aircraft Operations

- Review issues on airworthiness and aircraft operations relating to RVSM approval

Agenda Item 4: Safety and Airspace Monitoring

- Review safety assessment of RVSM operations in Bay of Bengal and Beyond
- Complete safety oversight arrangements for RVSM operations in Bay of Bengal and Beyond

Agenda Item 5: Implementation Management Considerations

- Review activities relating to implementation of RVSM

Agenda Item 6: Any Other Business

Agenda Item 7: Future Work

STATE LETTER AN 13/2.1-04/72

International Civil Aviation Organization
Organisation de l'aviation civile internationale
Organización de Aviación Civil Internacional
Международная организация гражданской авиации
منظمة الطيران المدني الدولي
国际民用航空组织

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Ref.: AN 13/2.1-04/72

30 July 2004

Subject: Approval of Amendment 3 to the PANS-ATM

Action required: a) Implementation of the amendment on 25 November 2004; b) Publication of any differences as of 25 November 2004

Sir/Madam,

1. I have the honour to inform you that the Air Navigation Commission, acting under delegated authority, at the tenth meeting of its 166th Session, on 3 June 2004, approved Amendment 3 to the *Procedures for Air Navigation Services — Air Traffic Management*, Fourteenth Edition (PANS-ATM, Doc 4444) for applicability on 25 November 2004. The amendment was approved on 29 June 2004 by the President of the Council on behalf of the Council in accordance with established procedure.

2. Amendment 3 stems from a review by the Secretariat of provisions in respect of procedures for aerodrome control service and definitions concerning runway safety as well as air traffic control phraseologies, Recommendation 3/3 of the fourth meeting of the Global Navigation Satellite System (GNSS) Panel and the Meteorological Divisional Meeting (2002).

3. The amendment introduces new or amended provisions concerning:

a) runway incursions and reporting thereon;

b) phraseologies dealing with 8.33 kHz channel spacing, reduced vertical separation minimum (RVSM) and GNSS; and

c) the transmission of special air-reports and other meteorological information.

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4. The inclusion of new phraseologies for 8.33 kHz channel spacing and RVSM in Amendment 3 to the PANS-ATM obviates the need for similar provisions in the *Regional Supplementary Procedures* (SUPPs, Doc 7030). A consequential amendment, deleting the corresponding provisions from the SUPPs with effect from 25 November 2004, is therefore in progress. As of that date, the PANS-ATM provisions will supersede the SUPPs.

5. Copies of the interim edition of the amendment are being sent to you under separate cover. The interim edition contains the text as it was approved by the Council and is being sent to you pending the issue of the replacement pages for the PANS-ATM in which the amendment will be incorporated. The replacement pages are expected to be forwarded to you in October 2004.

6. In accordance with the decision of the 26th Session of the Assembly, I would like to bring to your attention the Organization's long-standing practice of providing documentation to States upon request. Accordingly, the relevant working papers on Amendment 3 to the PANS-ATM and corresponding minutes of the Council and the Air Navigation Commission proceedings can be made available. In light of the costs involved, however, only one copy of such documents will normally be provided.

7. Your Government is invited by the Council to implement the provisions of the PANS-ATM as amended. In this connection, I draw your attention to the decision taken by the Council, on 1 October 1973, to discontinue the publication of differences in Supplements to the PANS documents and, instead, to request States to publish up-to-date lists of significant differences from PANS documents in their Aeronautical Information Publications.

8. May I, therefore, invite your Government to publish in your Aeronautical Information Publication a list of any significant differences which will exist on 25 November 2004 between the amended provisions of the PANS-ATM and your national regulations and practices.

Accept, Sir/Madam, the assurances of my highest consideration.

Taïeb Chérif
Secretary General

Under separate cover:
Interim edition of Amendment 3 to the PANS-ATM

AMENDMENT No. 3

TO THE

PROCEDURES
FOR
AIR NAVIGATION SERVICES

AIR TRAFFIC MANAGEMENT

(Doc 4444)

INTERIM EDITION

The text of Amendment No. 3 to the PANS-ATM (Doc 4444) was approved by the President of the Council of ICAO on behalf of the Council on **29 June 2004** for applicability on **25 November 2004**. This interim edition is distributed to facilitate implementation of the amendment by States. Replacement pages incorporating Amendment No. 3 are expected to be distributed in October 2004.

JULY 2004

INTERNATIONAL CIVIL AVIATION ORGANIZATION

NOTES ON THE PRESENTATION OF THE AMENDMENT TO THE PANS-ATM

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

1. ~~Text to be deleted is shown with a line through it.~~	text to be deleted
2. New text to be inserted is highlighted with grey shading.	new text to be inserted
3. ~~Text to be deleted is shown with a line through it~~ followed by the replacement text which is highlighted with grey shading.	new text to replace existing text

CHAPTER 7. PROCEDURES FOR AERODROME CONTROL SERVICE

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7.3.1.4 RUNWAY INCURSION OR OBSTRUCTED RUNWAY

7.3.1.4.1 In the event the aerodrome controller ~~observes~~, after a take-off clearance or a landing clearance has been issued, becomes aware of a runway incursion or the imminent occurrence thereof, or the existence of any obstruction on or in close proximity to the runway likely to impair the safety of an aircraft taking off or landing, ~~such as a runway incursion by an aircraft or vehicle, or animals or flocks of birds on the runway;~~ appropriate action shall be taken as follows:

a) ~~in all cases inform the aircraft concerned of the obstruction and its location on the runway;~~ cancel the take-off clearance for a departing aircraft;

b) ~~cancel the take-off clearance for an aircraft which has not started to roll;~~ instruct a landing aircraft to execute a go-around or missed approach;

c) ~~instruct a landing aircraft to go around.~~ in all cases inform the aircraft of the runway incursion or obstruction and its location in relation to the runway.

Note. — Animals and flocks of birds may constitute an obstruction with regard to runway operations. In addition, an aborted take-off or a go-around executed after touchdown may expose the aeroplane to the risk of overrunning the runway. Moreover, a low altitude missed approach may expose the aeroplane to the risk of a tail strike. Pilots may, therefore, have to exercise their judgement in accordance with Annex 2, 2.4 concerning the authority of the pilot-in-command of an aircraft.

7.3.1.4.2 Following any occurrence involving an obstruction on the runway or a runway incursion, pilots and controllers shall complete an air traffic incident report in accordance with the ICAO model air traffic incident report form.

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CHAPTER 9. FLIGHT INFORMATION SERVICE AND ALERTING SERVICE

9.1 Flight information service

9.1.3 Transmission of information

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9.1.3.2 *Transmission of special air-reports, SIGMET and AIRMET information*

9.1.3.2.1 Appropriate SIGMET and AIRMET information, as well as special air-reports which have not been used for the preparation of a SIGMET, shall be disseminated to aircraft by one or more of the means specified in 9.1.3.1.1 above as determined on the basis of regional air navigation agreements. ~~Special air-reports shall be disseminated to aircraft for a period of 60 minutes after their issuance.~~

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CHAPTER 11. AIR TRAFFIC SERVICES MESSAGES

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11.4.3 Flight information messages

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11.4.3.2.3.2.3 In ~~meteorological reports disseminated beyond the aerodrome~~ METAR and SPECI, the visibility shall be representative of the aerodrome and its ~~immediate~~ vicinity. In the case of significant directional variations in visibility:

a) the ~~lowest~~ prevailing visibility shall be reported; and

b) ~~additional values~~ the lowest visibility shall be ~~given~~ reported with an indications of the direction of observation.

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CHAPTER 12. PHRASEOLOGIES

12.2 GENERAL

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12.2.3 Section 12.3 includes phrases for use by pilots, ATS personnel and other ground personnel. ~~Phraseologies for the movement of vehicles, other than tow-tractors, on the manoeuvring area are not listed separately as the phraseology associated with the movement of aircraft is applicable, with the exception of taxi instructions, in which case the word "PROCEED" shall be substituted for the word "TAXI" when communicating with vehicles.~~

12.2.4 During operations in or vertical transit through reduced vertical separation minimum (RVSM) airspace with aircraft not approved for RVSM operations, pilots shall report non-approved status in accordance with 12.3.1.11 c) as follows:

a) at initial call on any channel within RVSM airspace;

b) in all requests for level changes; and

c) in all read-backs of level clearances.

12.2.5 Air traffic controllers shall explicitly acknowledge receipt of messages from aircraft reporting RVSM non-approved status.

12.2.6 Phraseologies for the movement of vehicles, other than tow-tractors, on the manoeuvring area shall be the same as those used for the movement of aircraft, with the exception of taxi instructions, in which case the word "PROCEED" shall be substituted for the word "TAXI" when communicating with vehicles.

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12.3 ATC PHRASEOLOGIES

12.3.1 General

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	Circumstances	*Phraseologies*
12.3.1.4	8.33 kHz CHANNEL SPACING *Note — In this paragraph, the term "point" is used only in the context of naming the 8.33 kHz channel spacing concept and does not constitute any change to existing ICAO provisions or phraseology regarding the use of the term "decimal".*	
	... to request confirmation of 8.33 kHz capability	a) CONFIRM EIGHT POINT THREE THREE
	... to indicate 8.33 kHz capability	*b) AFFIRM EIGHT POINT THREE THREE
	... to indicate lack of 8.33 kHz capability	*c) NEGATIVE EIGHT POINT THREE THREE
	... to request UHF capability	d) CONFIRM UHF
	... to indicate UHF capability	*e) AFFIRM UHF
	... to indicate lack of UHF capability	*f) NEGATIVE UHF
	... to request status in respect of 8.33 kHz exemption	g) CONFIRM EIGHT POINT THREE THREE EXEMPTED
	... to indicate 8.33 kHz exempted status	*h) AFFIRM EIGHT POINT THREE THREE EXEMPTED
	... to indicate 8.33 kHz non-exempted status	*i) NEGATIVE EIGHT POINT THREE THREE EXEMPTED
	... to indicate that a certain clearance is given because otherwise a non-equipped and/or non-exempted aircraft would enter airspace of mandatory carriage	j) DUE EIGHT POINT THREE THREE REQUIREMENT
		* Denotes pilot transmission

12.3 ATC PHRASEOLOGIES

12.3.1 General

. . .

	Circumstances	*Phraseologies*
12.3.1.4	8.33 kHz CHANNEL SPACING *Note — In this paragraph, the term "point" is used only in the context of naming the 8.33 kHz channel spacing concept and does not constitute any change to existing ICAO provisions or phraseology regarding the use of the term "decimal".*	
	... to request confirmation of 8.33 kHz capability	a) CONFIRM EIGHT POINT THREE THREE
	... to indicate 8.33 kHz capability	*b) AFFIRM EIGHT POINT THREE THREE
	... to indicate lack of 8.33 kHz capability	*c) NEGATIVE EIGHT POINT THREE THREE
	... to request UHF capability	d) CONFIRM UHF
	... to indicate UHF capability	*e) AFFIRM UHF
	... to indicate lack of UHF capability	*f) NEGATIVE UHF
	... to request status in respect of 8.33 kHz exemption	g) CONFIRM EIGHT POINT THREE THREE EXEMPTED
	... to indicate 8.33 kHz exempted status	*h) AFFIRM EIGHT POINT THREE THREE EXEMPTED
	... to indicate 8.33 kHz non-exempted status	*i) NEGATIVE EIGHT POINT THREE THREE EXEMPTED
	... to indicate that a certain clearance is given because otherwise a non-equipped and/or non-exempted aircraft would enter airspace of mandatory carriage	j) DUE EIGHT POINT THREE THREE REQUIREMENT
		* Denotes pilot transmission

Renumber remaining paragraphs accordingly.

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	Circumstances	*Phraseologies*
12.3.1.8	ADDITIONAL REPORTS	a) REPORT PASSING *(significant point)*;
	... to request a report at a specified place or distance	b) REPORT *(distance)* FROM *(name of DME station)* DME *(or significant point)*;
		c) REPORT PASSING *(three digits)* RADIAL *(name of VOR)* VOR;
	... to request a report of present position	d) REPORT DISTANCE FROM *(significant point)*;
		e) REPORT DISTANCE FROM *(name of DME station)* DME.

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12.3.1.10	OPERATIONAL STATUS OF VISUAL AND NON-VISUAL AIDS	a) *(specify visual or non-visual aid)* RUNWAY *(number) (description of deficiency)*;
		b) *(type)* LIGHTING *(unserviceability)*;
		c) GBAS/SBAS/MLS/ILS CATEGORY *(category) (serviceability state)*;
		d) TAXIWAY LIGHTING *(description of deficiency)*;
		e) *(type of visual approach slope indicator)* RUNWAY *(number) (description of deficiency)*.
12.3.1.11	REDUCED VERTICAL SEPARATION MINIMUM (RVSM) OPERATIONS	
	... to ascertain RVSM approval status of an aircraft	a) CONFIRM RVSM APPROVED
	... to report RVSM approved status	*b) AFFIRM RVSM
	... to report RVSM non-approved status followed by supplementary information	*c) NEGATIVE RVSM [*(supplementary information, e.g. State Aircraft)*]
	Note.— See 12.2.4 and 12.2.5 for procedures relating to operations in RVSM airspace by aircraft with non-approved status.	

12.3.1.13	DEGRADATION OF AIRCRAFT NAVIGATION PERFORMANCE	UNABLE RNP *(specify type)* (*or* RNAV) [DUE TO *(reason e.g.* LOSS of RAIM *or* RAIM ALERT)].

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12.3.2.4	SPECIFICATION OF CRUISING LEVELS	a) CROSS *(significant point)* AT (*or* ABOVE, *or* BELOW) *(level)*; b) CROSS *(significant point)* AT *(time)* OR LATER (*or* BEFORE) AT *(level)*; c) CRUISE CLIMB BETWEEN *(levels)* (*or* ABOVE *(level)*); d) CROSS *(distance)* DME [*(direction)*] OF *(name of DME station)* [*or (distance)* [*(direction)*] OF *(significant point)*] AT (*or* ABOVE *or* BELOW) *(level)*.

12.3.5 Coordination between ATS units

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12.3.5.8	REDUCED VERTICAL SEPARATION MINIMUM (RVSM) OPERATIONS	
	... to verbally supplement estimate messages of aircraft non-approved for RVSM or to verbally supplement an automated estimate message exchange that does not automatically transfer information from Item 18 of the flight plan followed by supplementary information, as appropriate	a) NEGATIVE RVSM [(*supplementary information, e.g. State Aircraft*)]
	... to communicate the cause of a contingency relating to an aircraft that is unable to conduct RVSM operations due to severe turbulence or other severe meteorological phenomena or equipment failure, as applicable	b) UNABLE RVSM DUE TURBULENCE (*or* EQUIPMENT, as *applicable*)

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12.4 RADAR PHRASEOLOGIES

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12.4.2 Radar in approach control service

12.4.2.2 VECTORING FOR ILS AND OTHER PILOT-INTERPRETED AIDS

... when a pilot wishes to be positioned a specific distance from touchdown

... instructions and information

a) POSITION *(number)* KILOMETRES (*or* MILES) from *(fix)*. TURN LEFT (*or* RIGHT) HEADING *(three digits)*;

b) YOU WILL INTERCEPT *(radio aid or track) (distance)* FROM (*significant point or* TOUCHDOWN);

*c) REQUEST *(distance)* FINAL;

d) CLEARED FOR *(type of approach)* APPROACH RUNWAY *(number)*;

e) ~~REPORT ESTABLISHED [ON MLS APPROACH TRACK] or [ON ILS (LOCALIZER) or (GLIDE PATH)]~~REPORT ESTABLISHED ON [ILS] LOCALIZER (*or* ON GBAS/SBAS/MLS APPROACH COURSE);

f) CLOSING FROM LEFT (*or* RIGHT) [REPORT ESTABLISHED];

g) TURN LEFT (*or* RIGHT) HEADING *(three digits)* [TO INTERCEPT] *or* [REPORT ESTABLISHED];

h) EXPECT VECTOR ACROSS *(localizer course or radio aid) (reason)*;

i) THIS TURN WILL TAKE YOU THROUGH *(localizer course or radio aid)* [*reason*];

j) TAKING YOU THROUGH *(localizer course or radio aid)* [*reason*];

k) MAINTAIN *(altitude)* UNTIL GLIDE PATH INTERCEPTION;

l) REPORT ESTABLISHED ON GLIDE PATH;

m) INTERCEPT *(localizer course or radio aid)* [REPORT ESTABLISHED].

* Denotes pilot transmission.

12.4.2.3	MANOEUVRE DURING INDEPENDENT AND DEPENDENT PARALLEL APPROACHES	a) CLEARED FOR ~~ILS (or MLS)~~*(type of approach)* APPROACH RUNWAY *(number)* LEFT (*or* RIGHT); b) YOU HAVE CROSSED THE LOCALIZER (*or* GBAS/SBAS/MLS FINAL APPROACH ~~TRACK~~COURSE). TURN LEFT (*or* RIGHT) IMMEDIATELY AND RETURN TO THE LOCALIZER (*or* GBAS/SBAS/MLS FINAL APPROACH ~~TRACK~~COURSE); c) ILS (*or* MLS) RUNWAY *(number)* LEFT (*or* RIGHT) LOCALIZER (*or* MLS) FREQUENCY IS *(frequency)*;
	... for avoidance action when an aircraft is observed penetrating the NTZ	d) TURN LEFT (*or* RIGHT) *(number)* DEGREES (*or* HEADING) *(three digits)* IMMEDIATELY TO AVOID TRAFFIC [DEVIATING FROM ADJACENT APPROACH], CLIMB TO *(altitude)*;
	... for avoidance action below 120 m (400 ft) above the runway threshold elevation where parallel approach obstacle assessment surfaces (PAOAS) criteria are being applied	e) CLIMB TO *(altitude)* IMMEDIATELY TO AVOID TRAFFIC [DEVIATING FROM ADJACENT APPROACH] (further instructions).

CHAPTER 16. MISCELLANEOUS PROCEDURES

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16.3 AIR TRAFFIC INCIDENT REPORT

16.3.1 An air traffic incident report ~~should~~ shall be submitted, normally to the air traffic services unit concerned, for incidents specifically related to the provision of air traffic services involving such occurrences as aircraft proximity (AIRPROX), obstructions on runways, runway incursions, or other serious difficulty resulting in a hazard to aircraft, caused by, among others, faulty procedures, non-compliance with procedures, or failure of ground facilities.

APPENDIX 4. AIR TRAFFIC INCIDENT REPORT

1. ICAO model air traffic incident report form

AIR TRAFFIC INCIDENT REPORT FORM	
For use when submitting and receiving reports on air traffic incidents. In an initial report by radio, shaded items should be included.	
A — AIRCRAFT IDENTIFICATION	**B — TYPE OF INCIDENT** AIRPROX / **OBSTRUCTION ON RUNWAY/RUNWAY INCURSION** / PROCEDURE / FACILITY*

...

— END —

Draft
LETTER OF AGREEMENT
BETWEEN KUNMING ACC AND YANGON ACC

Subject: Procedures for Air Traffic Control Coordination between Kunming ACC and Yangon ACC.

1. Scope

1.1 The procedures detailed below apply to air traffic operating between Kunming ACC and Yangon ACC on ATS route A599 via LINSO, and are to be executed accordingly by Kunming ACC and Yangon ACC.

2. Purpose

This letter of agreement defines the co-ordination and transfer of control procedures which was agreed upon between Kunming ACC and Yangon ACC.

3. SEPARATION MINIMA

3.1 Vertical and lateral separations for the two Flight Information Regions are subject to the airspace designation.

The reduced vertical separation minimum (RVSM) of 1000 feet shall be applied between RVSM approved aircraft operating between FL290 and FL410 inclusive and Conventional vertical separation minimum (CVSM) of 2000 feet shall be applied between non-RVSM approved aircraft, non-RVSM and RVSM approved aircraft within Yangon FIR. CVSM with Metric System shall be applied to aircraft operating within Kunming FIR.

3.2 Longitudinal Time Separation minimum on the ATS route A599 shall be 10 minutes.

4. ATC CLEARANCE LIMIT

4.1 In all cases where co-ordination between the two Area Control Centers can be achieved before departure or prior to the transfer of control points after airborne, the clearance limit shall be the airport of destination.

4.2 Where co-ordination cannot be achieved in the event of failure of ATS Direct Speech Circuit, the clearance limit shall be the transfer of control point. If co-ordination can subsequently be achieved a revision to the clearance is to be issued according to PARA 4.1.

5. COMMUNICATIONS

5.1 An ATS Direct Speech Circuit between ACCs shall be provided on 24-hour basis. The number to be dialed by Yangon ACC is 6212, and by Kunming ACC is 7500/7501.

5.2 A direct radio Tele-printer circuit between the two ACCs shall be provided and operational on 24-hour basis for the use of exchanging messages.

5.3 In the event of ATS Direct Speech Circuit failure notification should be made using radio Tele-printer circuit utilizing priority prefix DD or IDD phone.

Kunming ACC 86 871 3136505; 86 871 7112833

Yangon ACC 95 1 666539; 95 1 662707

5.4 Voice Recorder shall be served for the recording/replaying purposes at both Kunming ACC and Yangon ACC, be kept for not less than 30 days.

6. CO-ORDINATION PROCEDURES AND TRANSFER OF CONTROL

6.1 Transfer of control point shall be at the common point of FIR boundary which is as follows:

ATS Route	TRANSFER OF CONTROL POINT
A599	LINSO (N23 22.5 E098 55.00)

6.2 For flights originating either from Kunming or from Yangon flight plan should be exchanged as soon as they are available and not later than 30 minutes before departure.

6.3 Yangon ACC shall transfer traffic to Kunming ACC at CVSM with Metric System:

11400m,10200m,9000m,8100m,7500m,6900m

Kunming ACC shall transfer traffic to Yangon ACC at:

12000m,10800m,9600m,8400m,7800m,7200m

6.4 Flight level change from Standard Chinese Metric (Meter) system to ICAO RVSM (Feet) system, or vice versa, shall be made within Yangon FIR. For westbound flight, level change from Standard Chinese Metric (Meter) to ICAO RVSM (Feet) shall be initiated from LINSO and completed before LSO in the territory of Myanmar. For eastbound flight, level change from Feet to Meter shall be initiated from LSO and completed before LINSO in the territory of Myanmar.

6.5 Level changing procedure is shown at MAP.1.

6.6 Transfer of control shall be transmitted in sufficient time preferably not less than 30 minutes by both ACCs in both ways and shall contain information in the following information:

a) The prefix “Estimate/Revision.”(indicate name of transfer point and the type of message.);

b) Aircraft identification;

c) Estimated time over transfer of control point;

d) Flight level;

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

6.8 In the event that contact with the aircraft is not established within 5 minutes after the estimated time over the transfer of control point, the receiving centre shall notify the transferring centre of the fact.

7. DEVIATIONS

Deviation from this Letter of Agreement shall be made only with the concurrence of both parties.

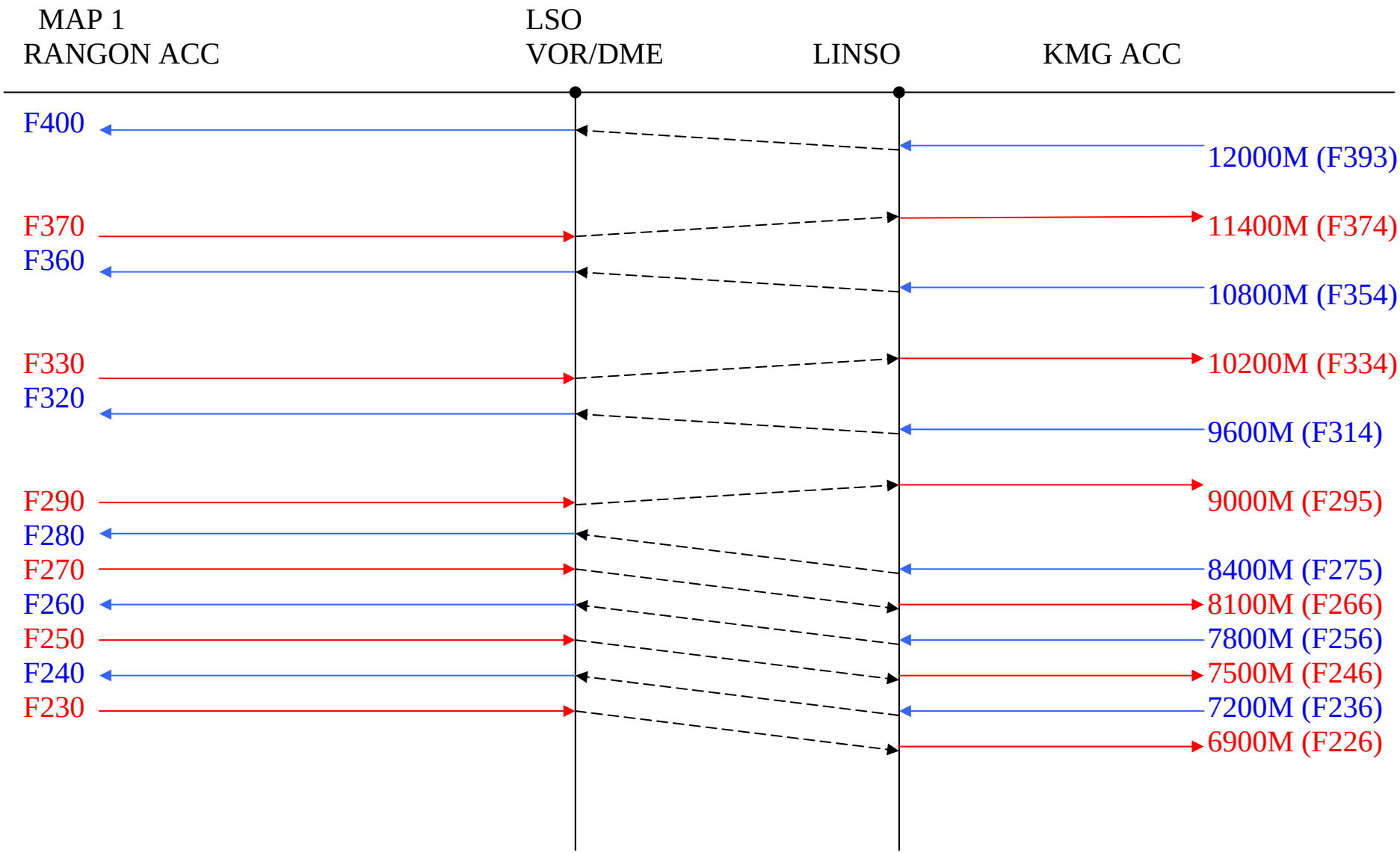
8. REVISION

This letter of agreement shall be revised after co-ordination as and when deemed necessary by either or both parties.

9. IMPLEMENTATION DATE

The date of implementation of this Letter of Agreement which will supercede all previous agreement and amendment thereto on the subject, shall be 1601 UTC on 20 JAN 2005.

Kunming ACC Representative	**Yangon ACC Representative**
Mr. Lei Guisheng	Mr. Yoa Shu
Director of ATC Service Department,	Deputy Director (Air Traffic Services)
Kunming Air Traffic Management Center	Department of Civil Aviation, Myanmar
Of CAAC	
Date:8 November 2004	Date:



NOTE: Red lines express eastbound level; Blue lines express westbound level.

SN	Activity	Start	Complete	Present Status	Group Responsible	
1	**Identify Operational Need**	**18-Jan-02**	**30-Nov-02**	**Completed**		
2	Agree operational concept for Bay of Bengal and beyond (within ICAO Asia Region)	18-Jan-02	30-Nov-02	**Completed**	ATC/WG, RVSM Task Force	
3	**Safety Assessment**	**18-Jan-02**	**31-Oct-03**	**Completed**		
4	Review available summary data (non-compliant aircraft, aberrant aircraft etc)	18-Jan-02	31-Oct-03	**Completed**	SAM/WG, MAAR, RVSM Task Force	
5	Examine history of height keeping errors related to ATC clearances and assess possible RVSM impact	18-Jan-02	31-Oct-03	**Completed**	SAM/WG, MAAR, RVSM Task Force	
6	Confirm RVSM risk model assumptions/parameters are consistent with airspace where RVSM is to be applied	18-Jan-02	31-Oct-03	**Completed**	SAM/WG, MAAR, RVSM Task Force	
7	Conduct simulations to predict occupancy after RVSM implementation	18-Jan-02	31-Oct-03	**Completed**	SAM/WG, MAAR, RVSM Task Force	
8	Collect weather and turbulence data for analysis - this should include Himalayan standing wave analysis	18-Jan-02	27-Nov-03	**Completed**	SAM/WG, OPSAIR, RVSM Task Force	
9	Report monthly large height deviations to APARMO/MAAR or equivalent monitoring agency (including operational errors)	18-Jan-02	Ongoing	**Completed**	ATS Providers, Users	
10	Collect traffic sample data for the month of July 2004 for 1-year review of safety oversight	4-Jul-04	31-Aug-04	**Completed**	ATS Providers	
11	**Feasibility Analysis**	**18-Jan-02**	**27-Nov-03**	**Completed**		
12	Examine the operational factors and workload associated with implementation	18-Jan-02	27-Nov-03	**Completed**	ATC/WG, RVSM Task Force	
13	**Determination of Requirements (airborne & ground systems)**	**18-Jan-02**	**27-Nov-03**	**Completed**		
14	States assess the impact of RVSM implementation on controller automation systems (eg equipment suffixes) and plan for upgrades/modificati	18-Jan-02	31-Oct-03	**Completed**	States	
15	**Aircraft & Operator Approval Requirements**	**18-Jan-02**	**27-Nov-03**	**Completed**		
16	Promulgate the operational approval process	18-Jan-02	7-Jun-02	**Completed**	OPS/AIR/WG, RVSM Task Force	
17	Notify States when significant changes occur to RVSM documentation	18-Jan-02	31-Oct-03	**Completed**	OPS/AIR/WG, RVSM Task Force	
18	**Perform Rulemaking (if required)**	**18-Jan-02**	**27-Nov-03**	**Completed**		
19	Recommend State airspace regulatory documentation	18-Jan-02	27-Nov-03	**Completed**	States	
20	**Perform Necessary Industry & International Co-ordination**	**18-Jan-02**	**27-Nov-03**	**Completed**		
21	Establish target implementation date	18-Jan-02	18-Jan-02	**Completed**	RVSM Task Force	
22	Report to ATS/AIS/SAR/SG/13	23-Jun-03	27-Jun-03	**Completed**	RVSM Task Force Chairman	
23	Process Doc 7030 amendment	18-Jan-02	27-Nov-03	**Completed**	ICAO Regional Office (to include BOB FIRs)	
24	Publish advance AIC	18-Jan-02	31-Jan-03	**Completed**	States	
25	Publish AIP Supplement containing RVSM policy/procedures	18-Jan-02	7-Nov-03	**Completed**	States	
26	Review inter-facility coordination procedures	18-Jan-02	27-Nov-03	**Completed**	States	
27	Finalize changes to Letters of Agreement	18-Jan-02	27-Nov-03	**Completed**	States	
28	Disseminate information on RVSM policy and procedures through FAA RVSM Website	7-Jun-02	31-Oct-03	**Completed**	OPS/AIR WG, RVSM Task Force	
29	**Approval of Aircraft & Operators**	**18-Jan-02**	**27-Nov-03**	**Completed**		
30	Establish approved operations readiness targets	18-Jan-02	18-Jan-02	**Completed**	IATA, ATC/WG, RVSM Task Force	
31	Assess operator readiness	18-Jan-02	31-Oct-03	**Completed**	IATA, OPS/AIR/WG	
32	**Develop Pilot & ATC Procedures**	**18-Jan-02**	**27-Nov-03**	**Completed**		
33	Review application of tactical offset procedure to mitigate the effects of wake turbulence and TCAS alerts	18-Jan-02	4-Jul-03	**Completed**	RVSM Task Force	

SN	Activity	Start	Complete	Present Status	Group Responsible	
34	Review weather and contingency procedures for applicability under RVSM	18-Jan-02	4-Jul-03	**Completed**	RVSM Task Force	
35	Publish appropriate Pilot/ATC policy & procedures on RVSM website	18-Jan-02	Ongoing	**Completed**	RVSM Task Force	
36	Identify transition areas and procedures	3-Sep-03	5-Sep-03	**Completed**	States, ATC/WG	
37	Conduct simulation modelling to assess impact of RVSM operations	18-Jan-02	27-Nov-03	**Completed**	States, ATC/WG	
38	Report on simulation activity	18-Jan-02	27-Nov-03	**Completed**	ATC/WG, RVSM Task Force	
39	Coordinate use of ACAS II (TCAS V.7) for RVSM operations	18-Jan-02	31-Oct-03	**Completed**	OPS/AIR/WG, RVSM Task Force	
40	Develop procedures for handling non-compliant aircraft (inc ferry & mntce) in ATS documentation	18-Jan-02	30-Sep-03	**Completed**	OPS/AIR/WG, ATC/WG, RVSM Task Force	
41	Develop mutually acceptable ATC procedures for non-approved State acft to transit RVSM airspace	18-Jan-02	30-Sep-03	**Completed**	ATC/WG, RVSM Task Force	
42	Implement procedures for suspension of RVSM	18-Jan-02	27-Nov-03	**Completed**	ATC/WG, RVSM Task Force	
43	Liaise with State defense authorities regarding military operations	18-Jan-02	27-Nov-03	**Completed**	States	
44	**Pilot & ATC Training**	**18-Jan-02**	**27-Nov-03**	**Completed**		
45	Provide Pilot/ATC training documentation based on past experience	18-Jan-02	Ongoing	**Completed**	IATA, RVSM Task Force	
46	Conduct local RVSM training for air traffic controllers	18-Jan-02	27-Nov-03	**Completed**	States, ATC/WG	
47	**Perform System Verificiation**	**18-Jan-02**	**31-Oct-03**	**Completed**		
48	Height keeping performance monitoring needed to undertake initial safety analysis	18-Jan-02	31-Oct-03	**Completed**	APARMO, MAAR and SAM/WG, RVSM Task Force	
49	Provide representative traffic movement data to APARMO / MAAR	18-Jan-02	Ongoing	**Completed**	States	
50	Undertake initial safety analysis	18-Jan-02	31-Mar-03	**Completed**	SAM/WG, RVSM Task Force	
51	Prepare/maintain regional status report detailing RVSM implementation plans	18-Jan-02	Ongoing	**Completed**	RVSM Task Force	
52	**Final Implementation Decision**	**18-Jan-02**	**27-Nov-03**	**Completed**	RVSM Task Force	
53	Review aircraft altitude-keeping performance and operational errors	18-Jan-02	31-Oct-03	**Completed**	SAM/WG, OPS/AIR/WG	
54	Complete ATS State documentation	18-Jan-02	7-Nov-03	**Completed**	States	
55	Publish Trigger NOTAM	18-Jan-02	17-Nov-03	**Completed**	States	
56	Complete readiness assessment	18-Jan-02	31-Oct-03	**Completed**	APARMO, MAAR and SAM/WG, RVSM Task Force	
57	Complete safety analysis	18-Jan-02	31-Oct-03	**Completed**	APARMO, MAAR and SAM/WG, RVSM Task Force	
58	**Declare Initial Operational Capability**	**18-Jan-02**	**27-Nov-03**	**Completed**	APARMO, MAAR and SAM/WG, RVSM Task Force	
59	**Monitor System Performance**	**18-Jan-02**	**27-Nov-04**	**Completed**		
60	Perform Follow-On Monitoring	18-Jan-02	Ongoing	**Completed**	APARMO, MAAR, OPS/AIR/WG, SAM/WG	
61	Adopt the global use of Minimum Monitoring Requirements (MMR)	12-Mar-04	Ongoing	**Completed**	RVSM Task Force	
62	Complete transition of monitoring functions from FAA to AEROTHAI	30-May-02	2-Sep-03	**Completed**	SAM/WG, MAAR	
63	**Declare Full Operational Capability**	**18-Jan-02**	**27-Nov-04**	**Completed**	RVSM Task Force	
64	Task Force/15 (Bangkok)	3-Jun-02	7-Jun-02	**Completed**	RVSM Task Force	
65	1st Joint Interface Meeting with Middle East RVSM Task Force (Abu Dhabi)	19-Oct-02	20-Oct-02	**Completed**	RVSM Task Force	
66	Seminar/5 (Bangkok) - 3 days	15-Jan-03	17-Jan-03	**Completed**	RVSM Task Force	

SN	Activity	Start	Complete	Present Status	Group Responsible	
67	Task Force/17 (Bangkok) - Bay of Bengal and Beyond Focus - 5 days	20-Jan-03	24-Jan-03	**Completed**	RVSM Task Force	
68	Special ATS Coordination Meeting (Kuala Lumpur) - FLOS for Bay of Bengal and Beyond	11-Aug-03	13-Aug-03	**Completed**	ATC/WG	
69	2nd Joint Interface Meeting with Middle East RVSM Task Force (Abu Dhabi) - 3 days	27-Aug-03	28-Aug-03	**Completed**	ATC/WG	
70	Special ATS Coordination Meeting (Bangkok) - Transition for Bay of Bengal and Beyond	3-Sep-03	5-Sep-03	**Completed**	ATC/WG	
71	Task Force/20 (New Delhi) - **Go/No-Go** for Bay of Bengal and Beyond implementation - 5 days	27-Oct-03	31-Oct-03	**Completed**	RVSM Task Force	
72	Review of Air Traffic Management using RVSM in Bay of Bengal and Beyond (Bangkok) - 3 days	7-Jan-04	9-Jan-04	**Completed**	RVSM Task Force Chairman, ATC/WG, IATA, India and Pakistan	
73	Task Force/21 (Bangkok) - 90 day follow up review on Bay of Bengal and Beyond implementation - 5 days	8-Mar-04	12-Mar-04	**Completed**	RVSM Task Force	
74	Task Force/24 (Bangkok) - 1 year follow up Bay of Bengal and Beyond implementation - 5 days	8-Nov-04	12-Nov-04	**Completed**		

FAA DOTS+ PRESENTATION

ato
AIR TRAFFIC ORGANIZATION

Asia to Europe Traffic Planning Using DOTS+ Online Track Advisory

Kevin T. Chamness
Program Manager, Oceanic Service Improvements
November, 2004

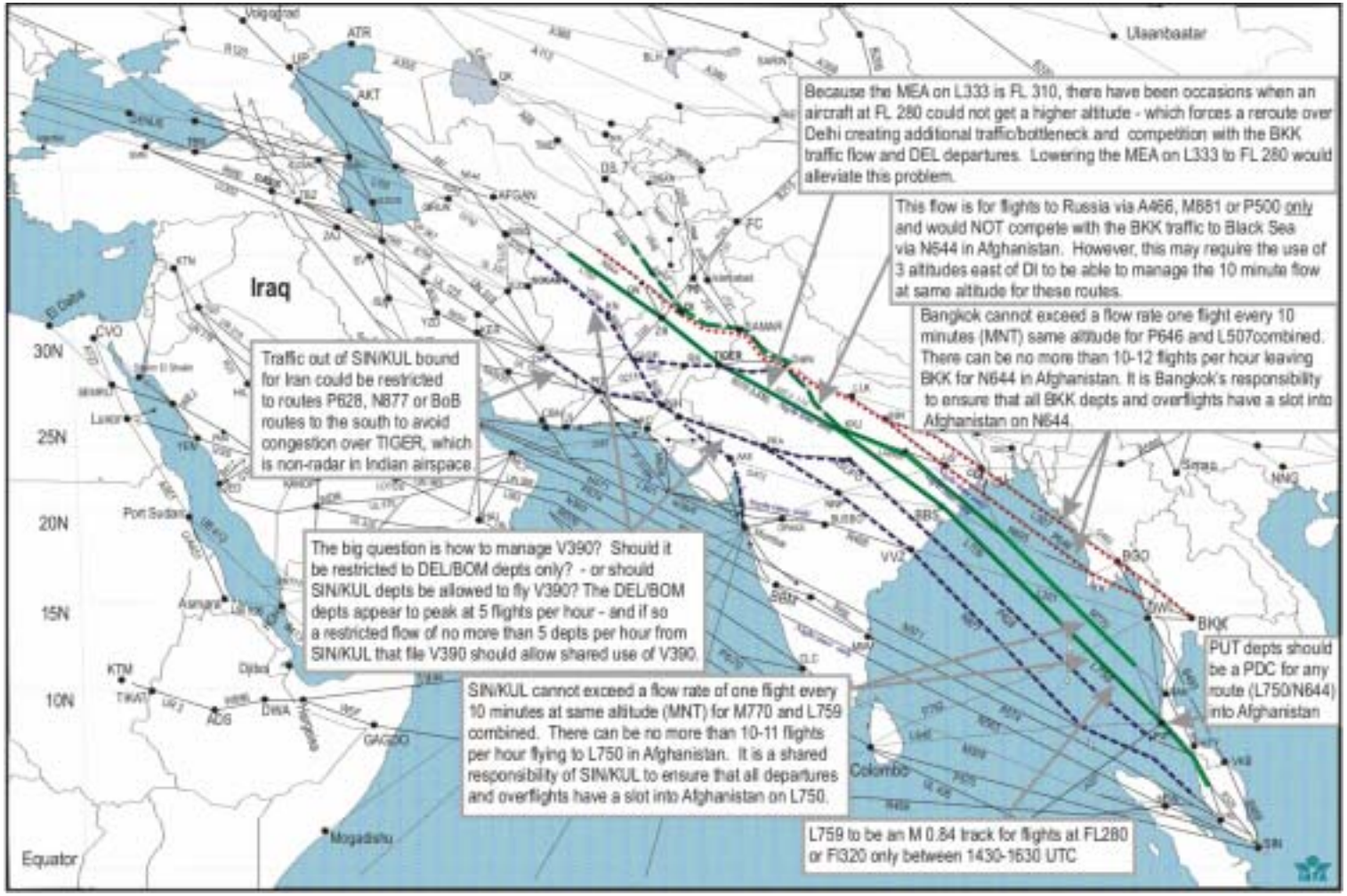
Route Congestion on Afghan Overflights

- Due to congestion and altitude restrictions on the westbound traffic flow from Asia to Europe, IATA is considering a centralised service for track advisory over Afghanistan.

- The service would be required to coordinate three independent traffic flows, likely over existing airways such as N644, L750 and V390.

- Affected flights involve a multiple air carriers. These flights primarily depart Delhi, Bangkok, Singapore, Kuala Lumpur and Mumbai.

Traffic Flow via V390, L750 and N644

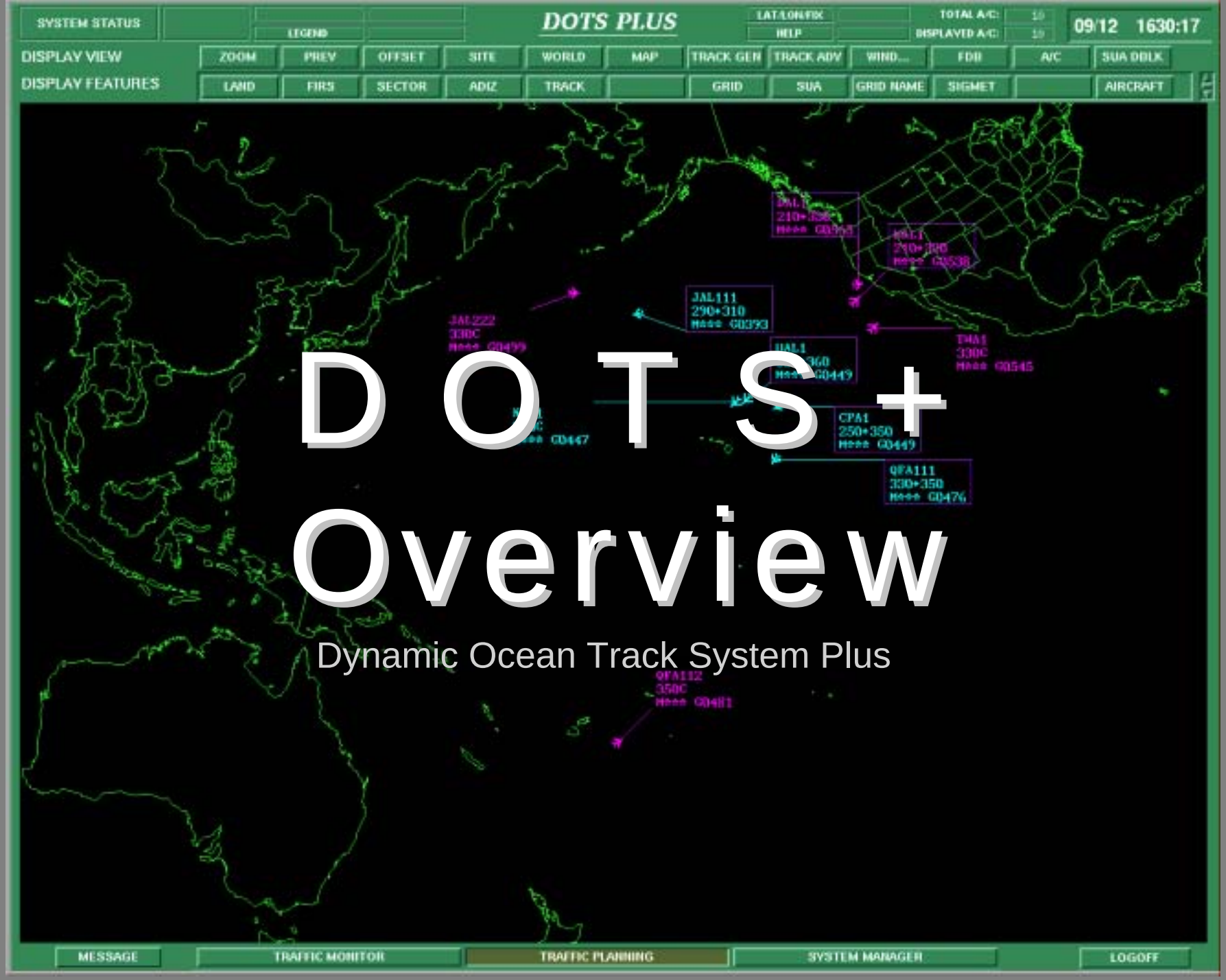


DOTS+ Track Advisory is a Possible Solution

- DOTS+ can designate metered gateway fixes for traffic flow on N644, L750, V390 and others.
- Aircraft operators submit gateway requests for flights including track, altitude and an ETA at the gateway fix for each flight.
- DOTS creates gateway reservation lists including constraints like flow and altitude restrictions for each track.

DOTS+ Track Advisory is a Possible Solution

- Gateway reservation lists can be dynamically adjusted to account for changes in aircraft departure times and requests.
- Online Track Advisory (OTA) for the Asia to Europe flow would be a self-policing service.
- Aircraft operators assume responsibility for meeting assigned gateway times at designated fixes and altitudes.



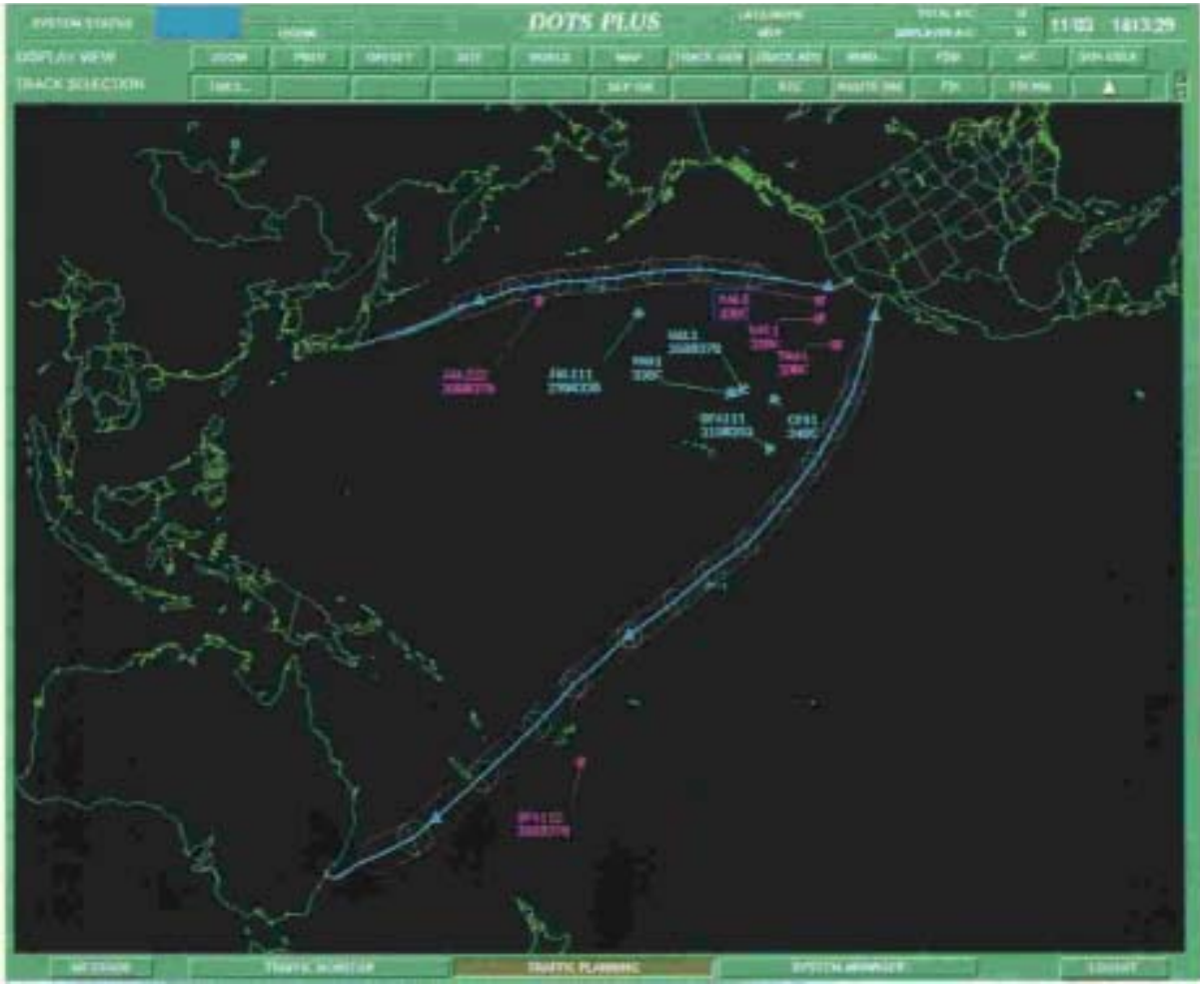
D O T S +
Overview

Dynamic Ocean Track System Plus

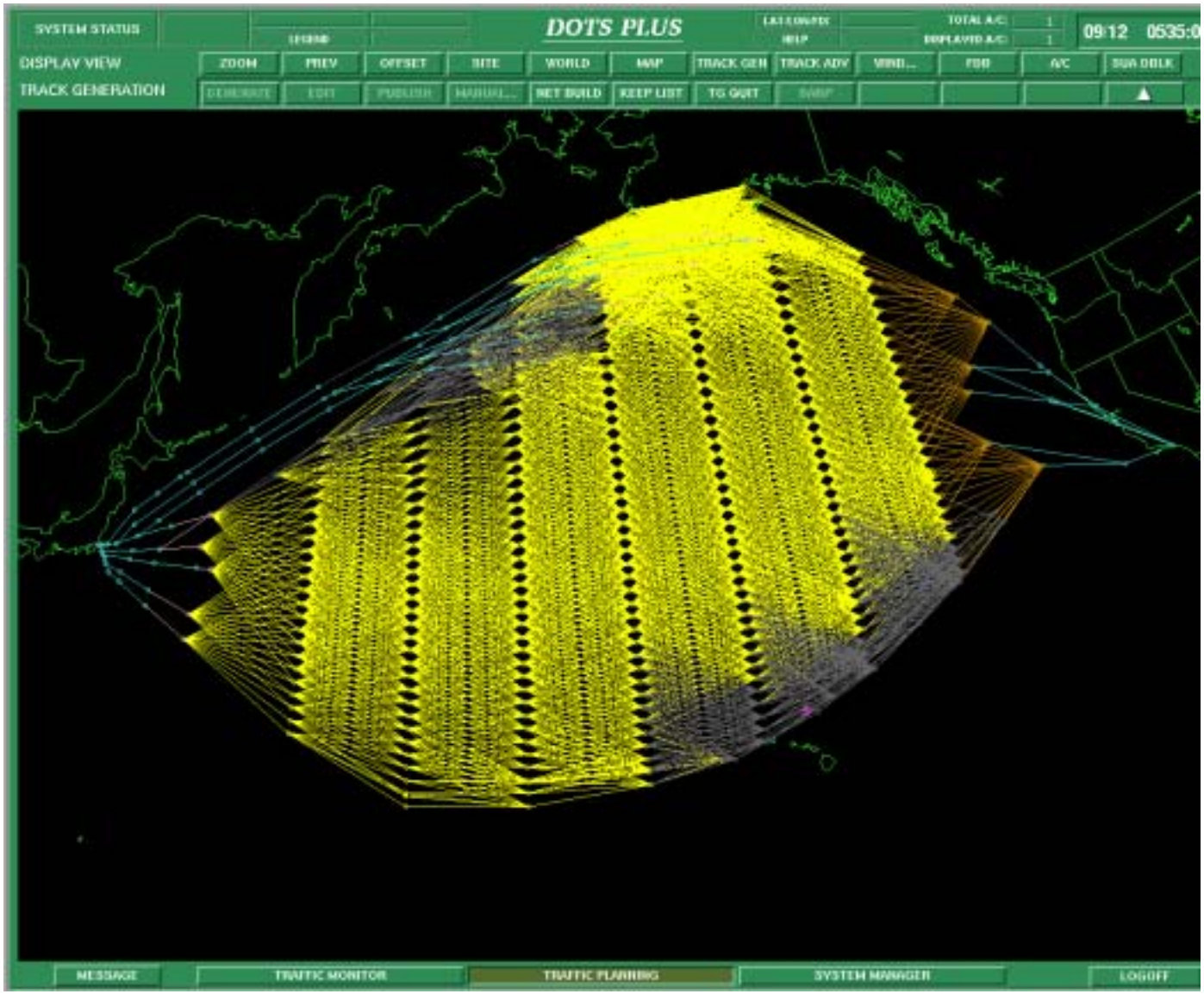
DOTS Plus Capabilities

Current capabilities of the DOTS Plus system include:

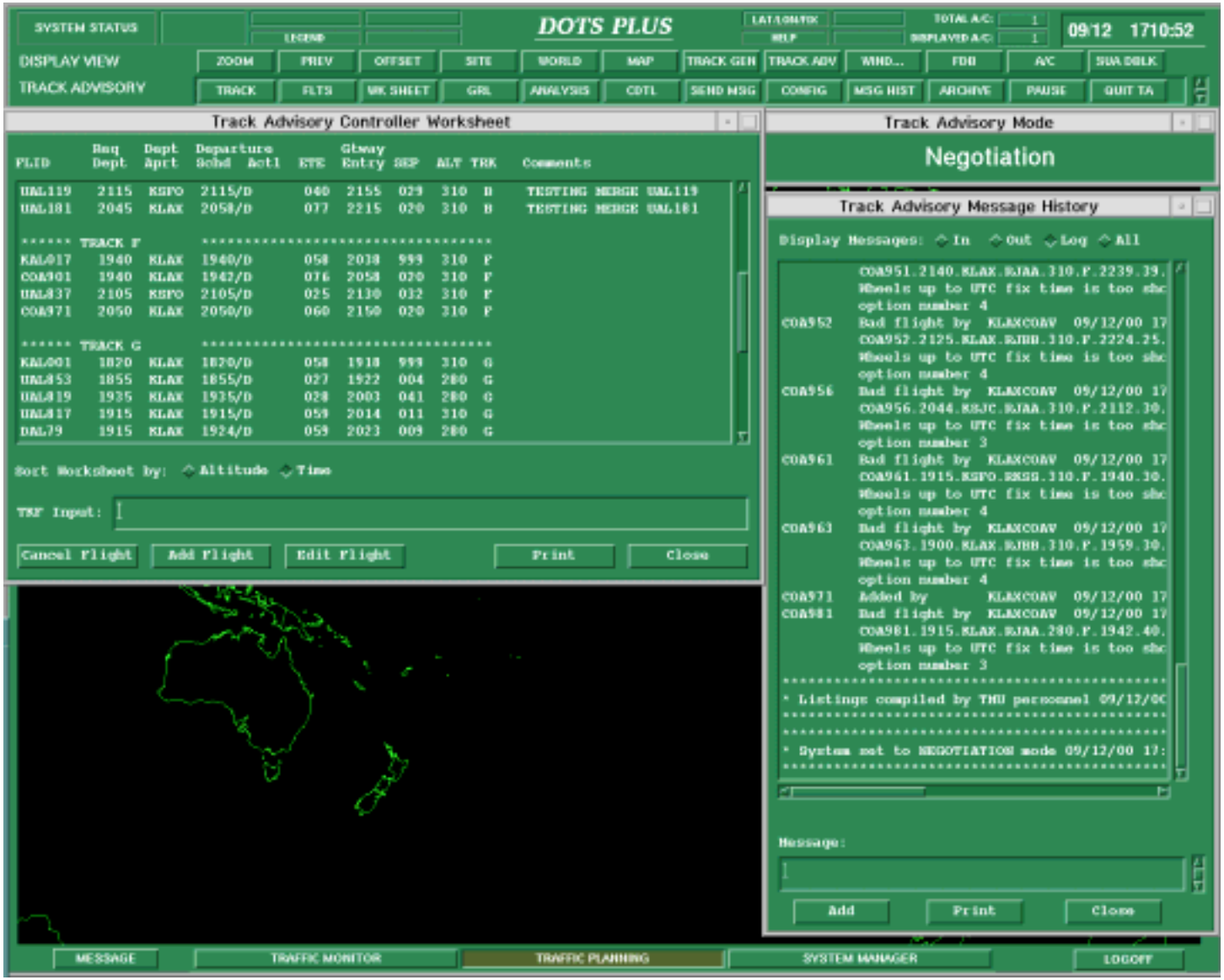
- *Optimized Flexible Track Systems*
- *Oceanic Traffic Situation Display*
- *Integrated Track Advisory Function*
- *External Messages*
- *Track Definition Messages*



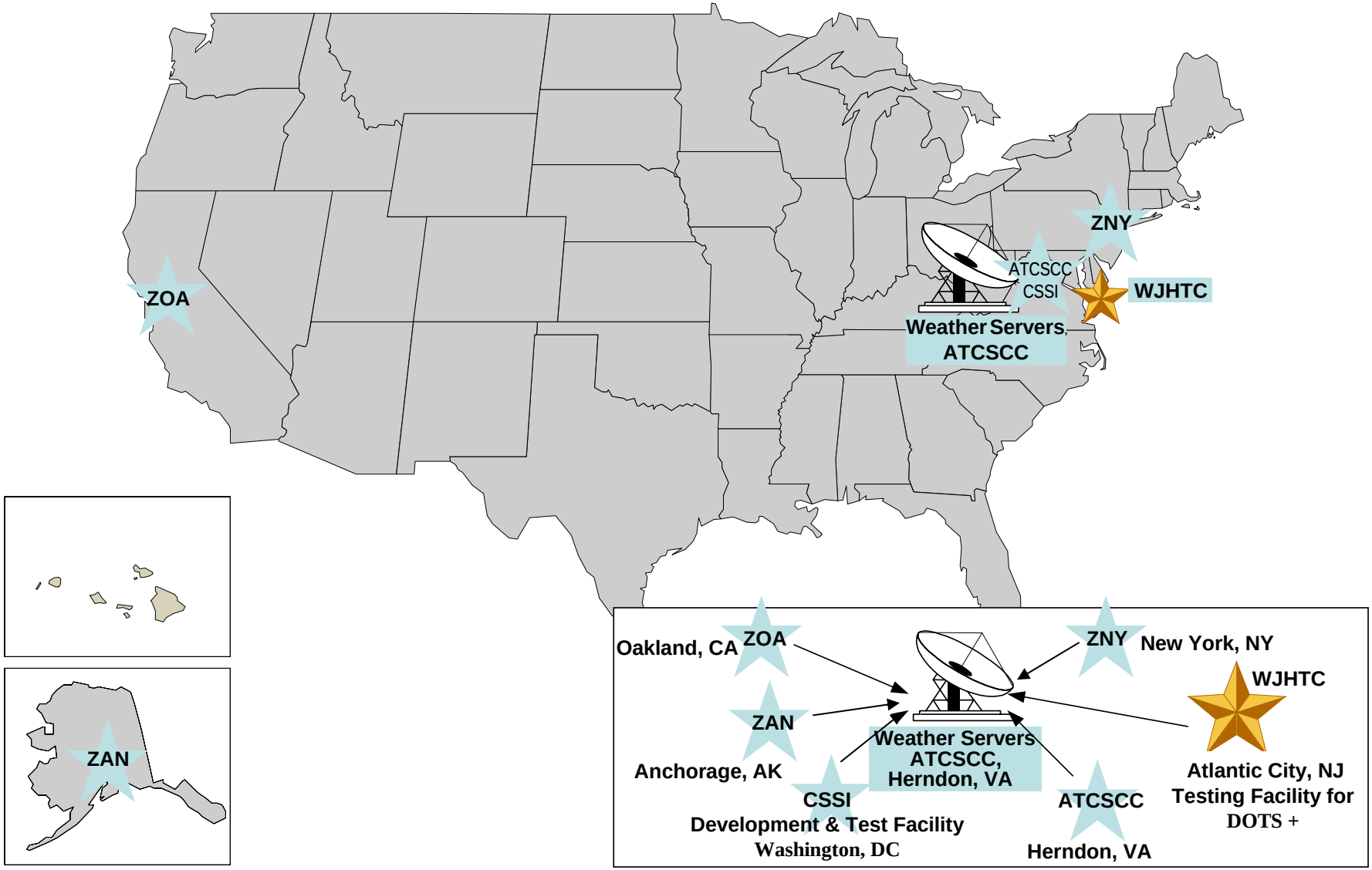
Flexible Track Optimization



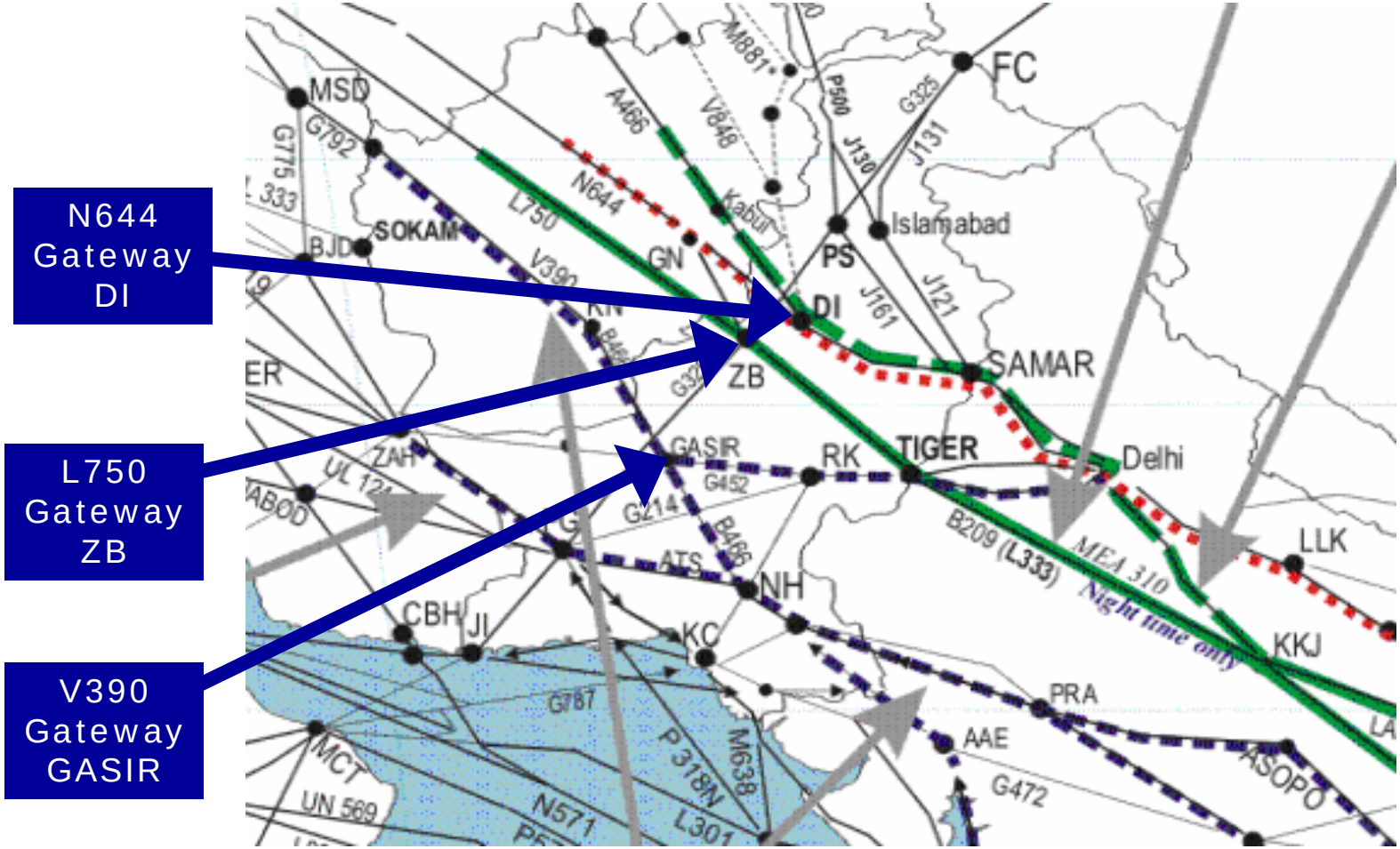
Track Advisory



DOTS Plus Implementation



Gateway Configuration Example



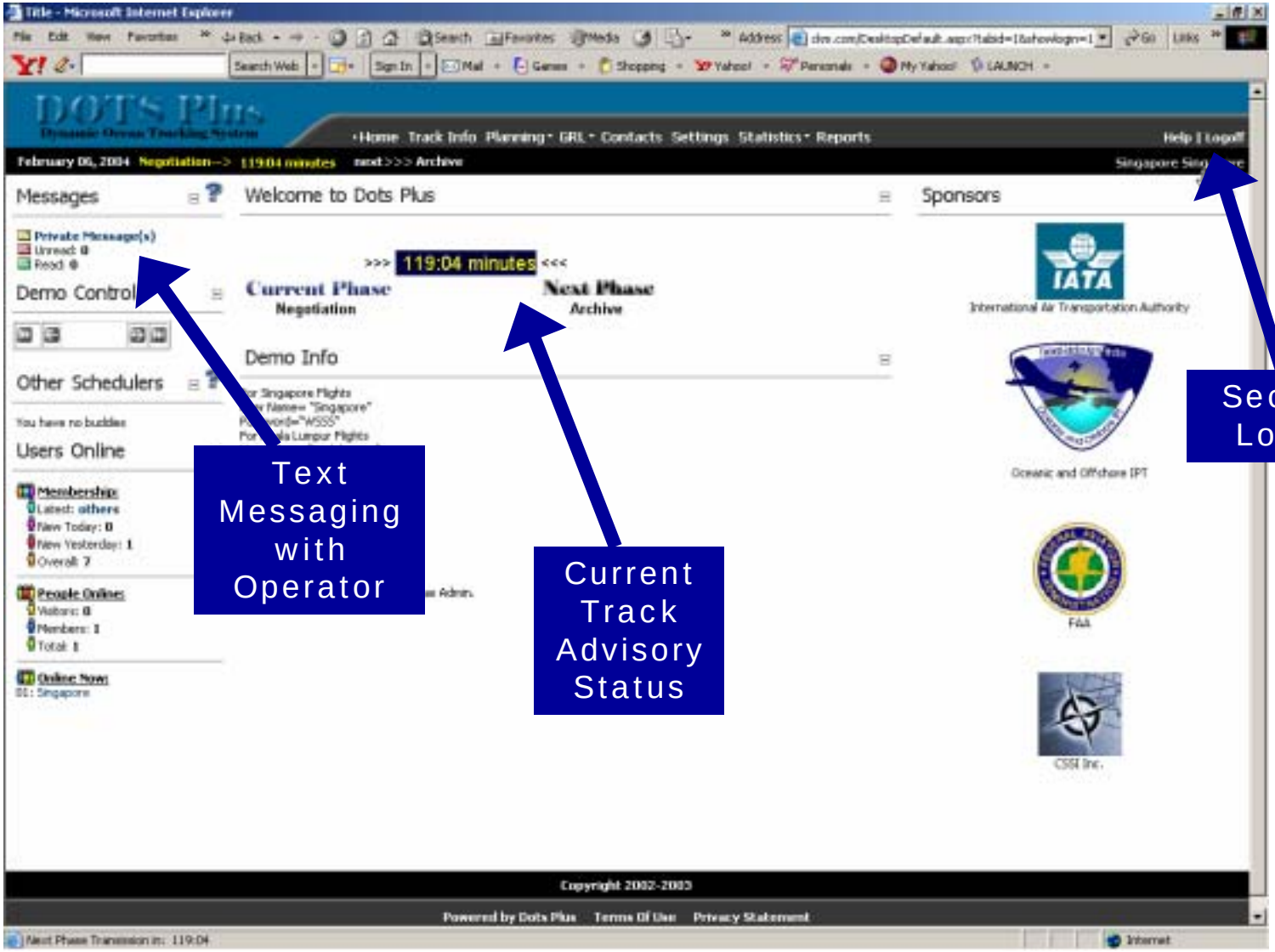
Gateway Configuration Example

- Gateway fixes are configurable (e.g. V390 gateway changes from GASIR to KN)
- Tracks can be restricted by altitude (e.g. L750 only available at FL310, FL330)
- Flow rates can be optimized per altitude (e.g. L750 flow at FL310 and FL330 is 15 min in trail, for an average of 8 flights per hour)
- Each track can be assigned a prioritization based on departure airport. (e.g. DEL/BOM flights have priority on V390. SIN/KUL flights may be assigned V390, space permitting)

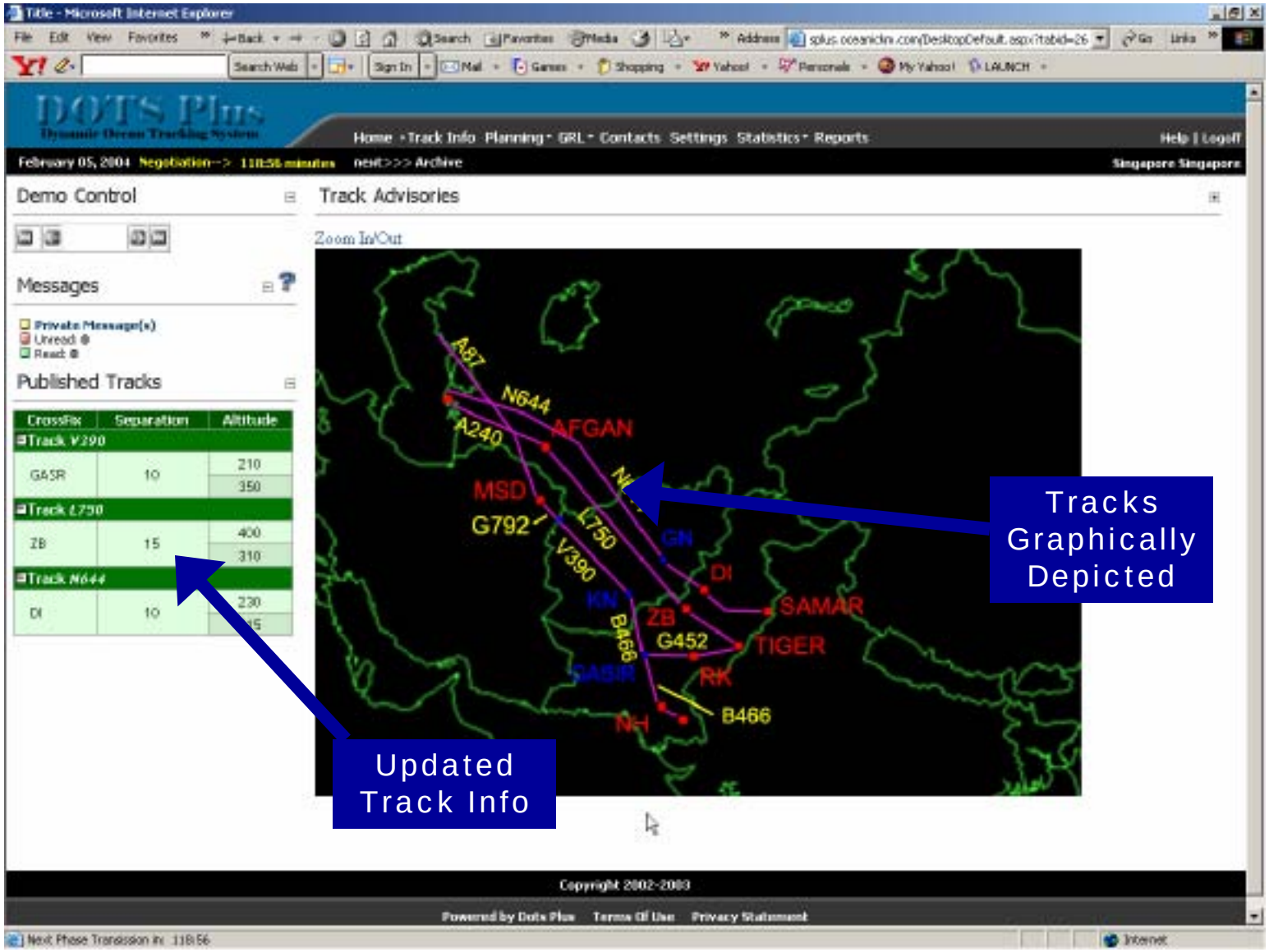
Proposed DOTS+ Online Track Advisory Web-based Interface

- Web accessible and password protected.
- The DOTS+ Track Advisory secure web server would be available from any location with internet access.
- User accessible web interface is in lieu of the AFTN/NADIN II exchange used for Oakland track advisory.
- A web interface is a more flexible and user friendly approach to Track Advisory.

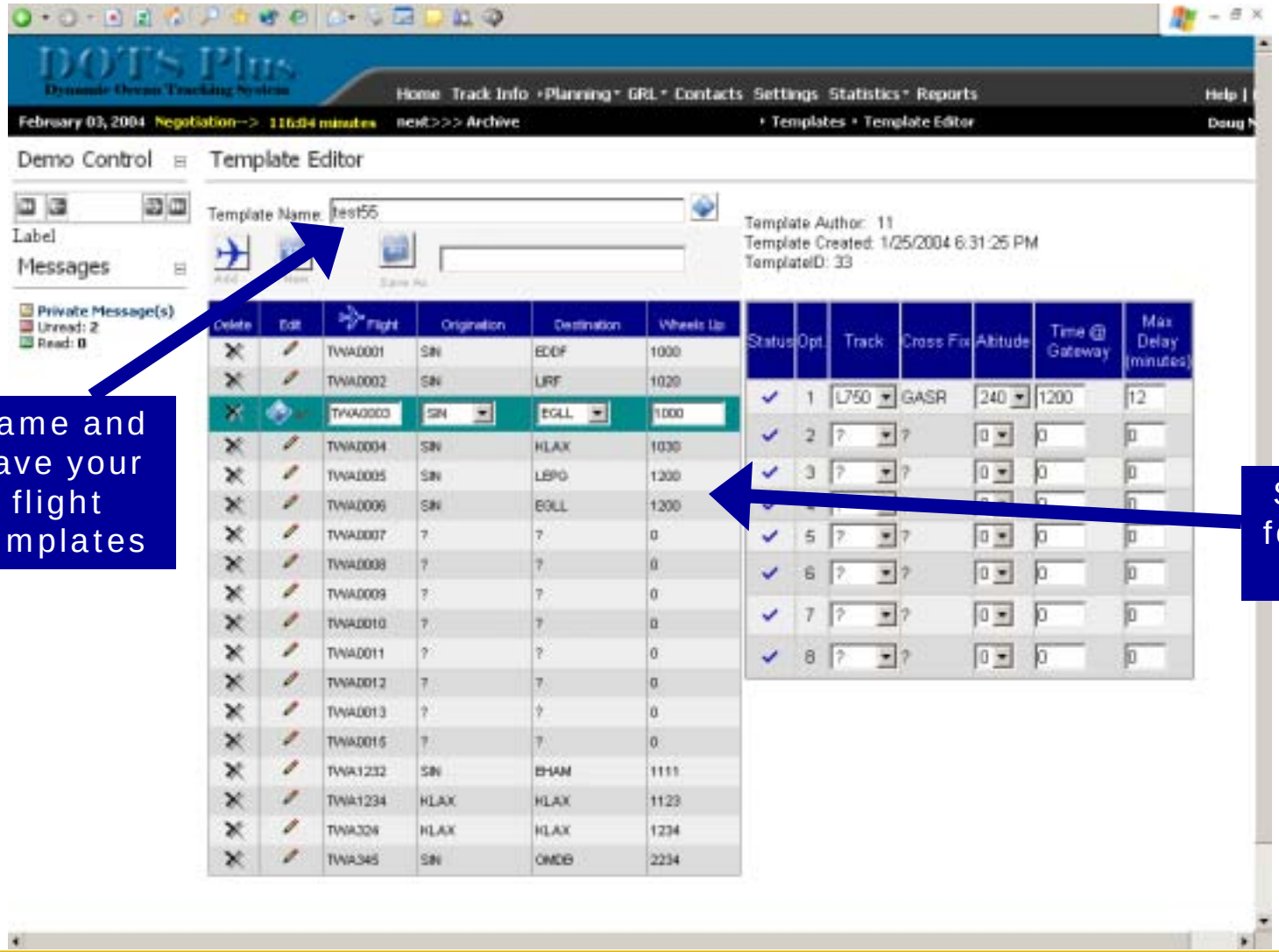
Step 1: Logon, Status and Messages



Step 2: Daily Updated Track View



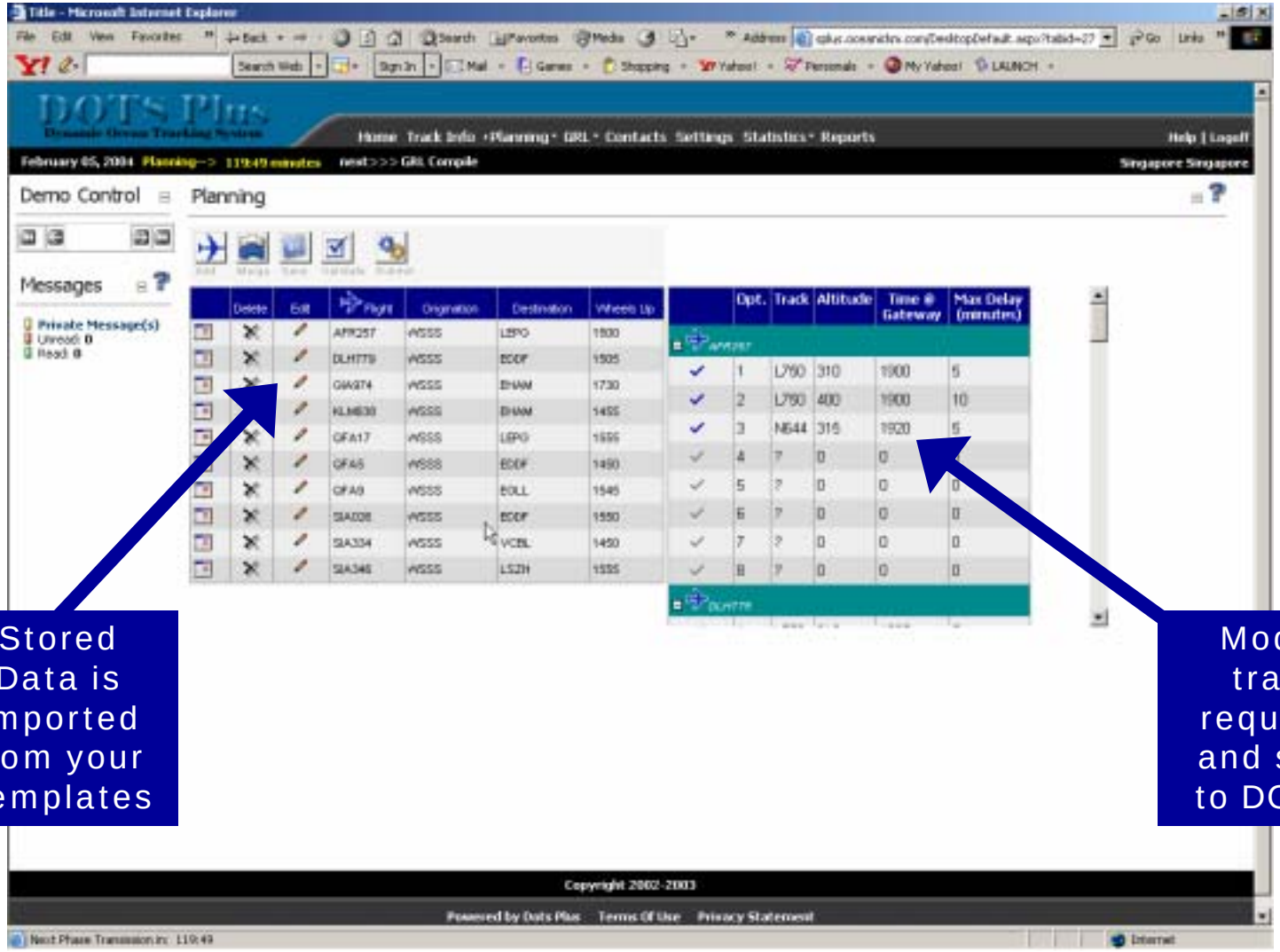
Step 3: Create Templates for Recurring Flights



Name and save your flight templates

Store Info for Routine Flights

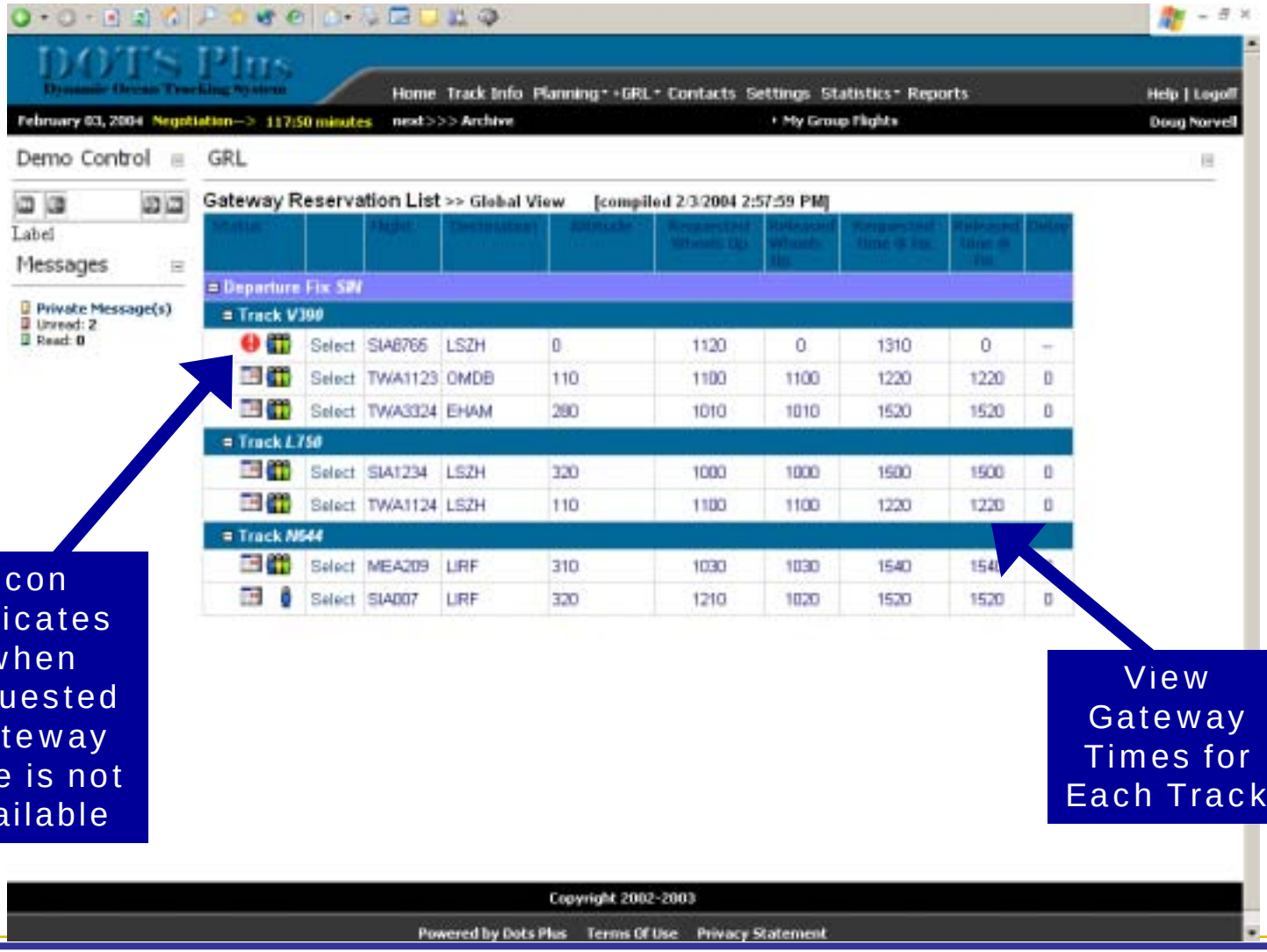
Step 4: Update Track Requests and Send Flight/Track Requests to DOTS+



Stored Data is Imported from your Templates

Modify track requests and send to DOTS+

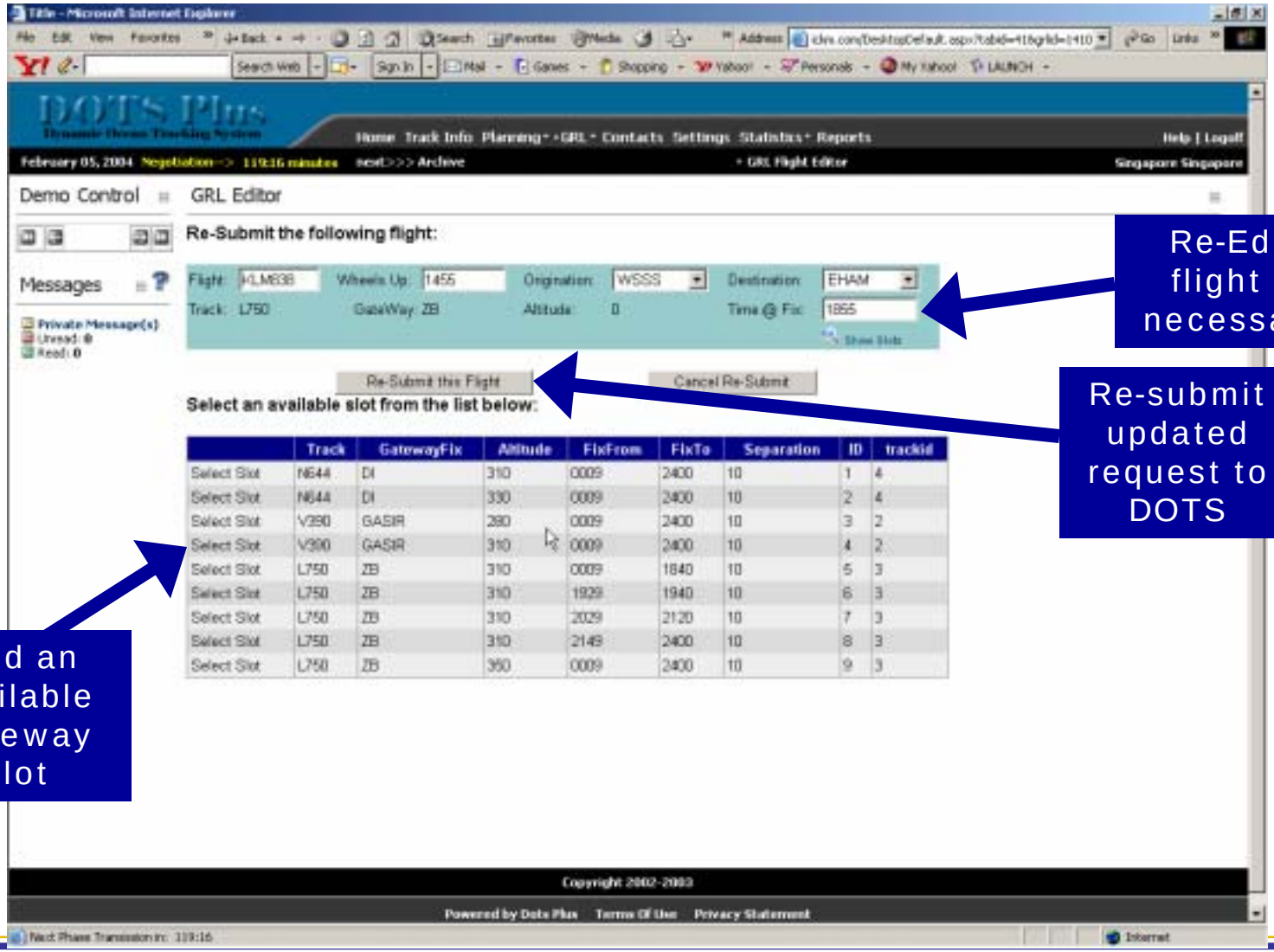
Step 5: View DOTS Generated Gateway Reservation List



Icon indicates when requested Gateway time is not available

View Gateway Times for Each Track

Step 6: Change and Re-submit Requests if Necessary



	Track	GatewayFix	Altitude	FixFrom	FixTo	Separation	ID	trackid
Select Slot	N644	DI	310	0009	2400	10	1	4
Select Slot	N644	DI	330	0009	2400	10	2	4
Select Slot	V390	GASIR	280	0009	2400	10	3	2
Select Slot	V390	GASIR	310	0009	2400	10	4	2
Select Slot	L750	ZB	310	0009	1840	10	5	3
Select Slot	L750	ZB	310	1929	1940	10	6	3
Select Slot	L750	ZB	310	2029	2120	10	7	3
Select Slot	L750	ZB	310	2149	2400	10	8	3
Select Slot	L750	ZB	350	0009	2400	10	9	3

Re-Edit flight if necessary

Re-submit updated request to DOTS

Find an available Gateway Slot

Paper Bay of Bengal Exercise

- The FAA and IATA ran a Track Advisory simulation for the Bay of Bengal in May, 2004.
- Nine air carriers participated by submitting Gateway Reservation Requests for a specified date.
- 39 Bay of Bengal flights were included in the simulation.
- DOTS+ generated Gateway Reservation Lists for N644, A466, L750, V390 and G462.
- To account for incomplete participation in the exercise, FL280 was reserved to simulate flight departing airports in Pakistan and India.

Paper Exercise Results with 15 Minute Flow Rate

- NUMBER OF FLIGHTS PUT INTO PROGRAM: 39
- NUMBER OF FLTS SCHEDULED ON-TIME: 23
- NUMBER OF FLTS SCHEDULED WITH DELAY: 14
- MINIMUM DELAY: 1
- MAXIMUM DELAY: 14
- AVERAGE DELAY TIME FOR DELAYED FLTS 7.5

Two flts were not placed due to maximum submitted delay times exceeded.

- Of the 37 flights placed, 36 were placed over their primary requested gateway and 31 were slotted at their primary requested altitude.

Paper Exercise Results with 10 Minute Flow Rate

- NUMBER OF FLIGHTS PUT INTO PROGRAM: 39
- NUMBER OF FLTS SCHEDULED ON-TIME: 29
- NUMBER OF FLTS SCHEDULED WITH DELAY: 10
- MINIMUM DELAY: 1
- MAXIMUM DELAY: 9
- AVERAGE DELAY TIME FOR DELAYED FLTS 6.6

All flights were placed

- Of the 39 flights placed, 39 were placed over their primary requested gateway and 35 were slotted at their primary requested altitude.

FAA Proposed Business Arrangement

- The OTA service can be added under the FAA's existing contract for DOTS+ software development and maintenance.
- If the region chooses the service, the software development, hardware and other setup expenses would be transferred to the sponsor via a one-time cost re-imbursement with FAA.
- Any ongoing Tech support service costs would be transferred to the sponsor via a continuing cost reimbursement agreement.

Cost Estimate for Online Track Advisory System

One-Time Costs	
Software Development ***Would include development of the web interface, the online database manager, and the web server to DOTS+ interface.***	***$100,000**
Hardware (Dedicated for Asia to Europe flow) ***Would include web server, operating system licenses, firewalls, dedicated DOTS+ serves and related peripherals, including setup and configuration testing. This would be a non-redundant configuration. (Overseas shipping cost of hardware is not included in this estimate)***	**$90,000**
Additional Costs	
Overseas site set-up cost ***One-time cost for time, materials, travel and expenses for the on-site set-up, configuration and testing of the OTA system.*** ***Training*** ***One-time cost for time, materials, travel and expenses required to train the local OTA operator.*** ***Tech Support Service*** ***Recurring cost for locally established OTA Tech Support and remote support as required.***	**TBD** **TBD** **TBD**

All costs are in US Dollars

*Would include an FAA administrative cost of approx 8%

www.ato.faa.gov

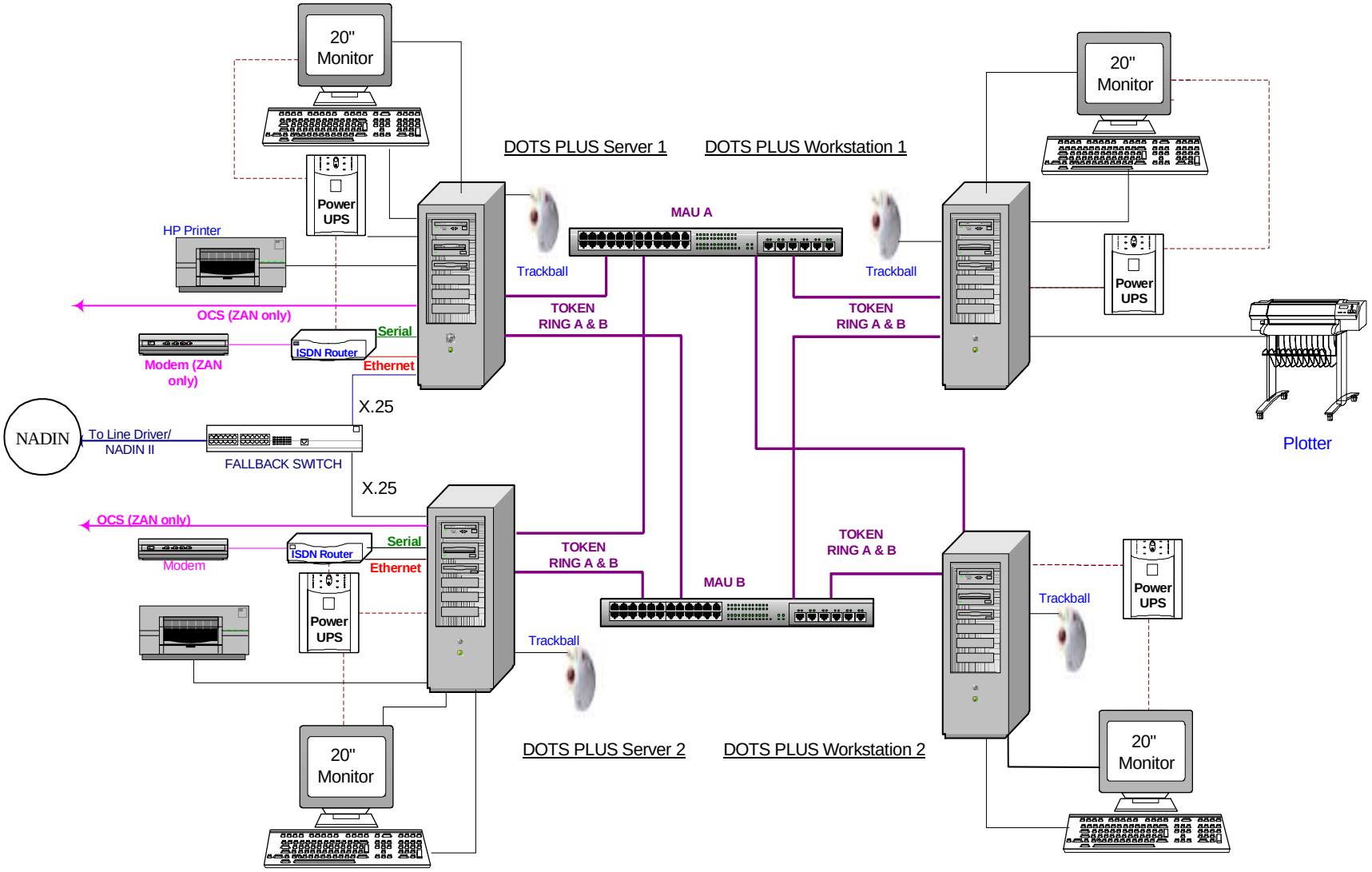
Back-up Information

Current Configuration

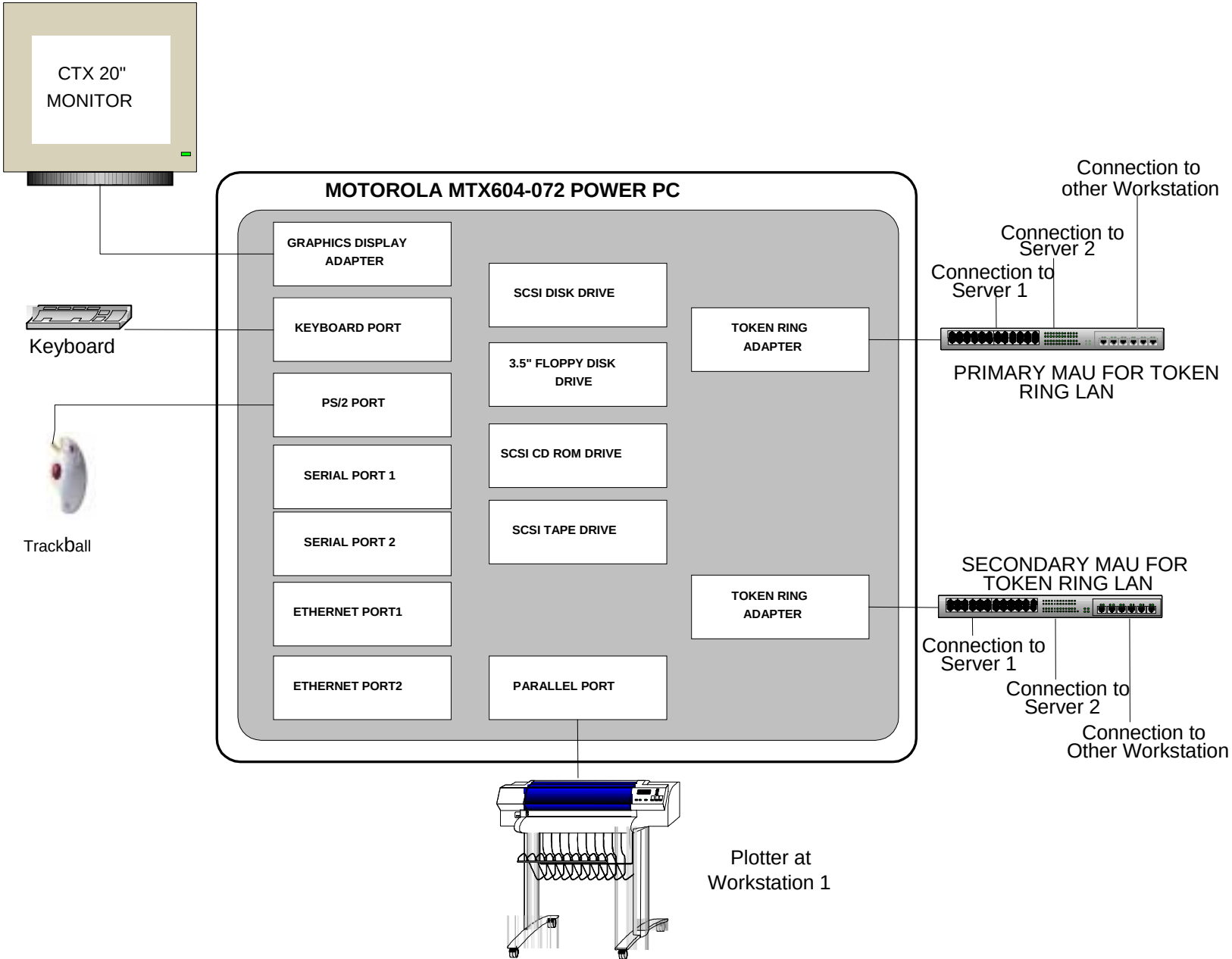
- The DOTS Plus system consists of four primary components:
  - DOTS Plus Servers
  - Workstations
  - Token Ring LANs
  - Weather Servers

- DOTS Plus operates in a UNIX environment under the IBM Advanced Interactive Executive (AIX) operating system version 4.3.2

Current Configuration



Workstation Configuration



Report on the Paper Exercise for Track Advisory in the Bay of Bengal

Background

Due to traffic congestion and delays on routes between points in Asia and Europe traversing the Bay of Bengal and Afghanistan, IATA and the Federal Aviation Administration have been exploring track advisory options in the region. The FAA's Dynamic Oceanic Tracking System (DOTS+) provides a metering function known as Track Advisory. This function, currently in operational use in the Pacific, may be useful in alleviating traffic congestion through the Bay of Bengal and Afghanistan by providing metered gateway reservations at strategic points in the affected airspace.

Paper Exercise Overview

The FAA and CSSI inc, with the support of IATA, conducted a paper simulation for track advisory in the Bay of Bengal. The simulation was conducted for a single day using data supplied by participating air carriers for gateway fixes on congested routes specified by IATA. The simulation asked participating air carriers to complete gateway reservation requests on a pre-determined day for each westbound flight planning to fly on tracks N644, A466, L750, V390 or G462.

Air carriers participating in the Track Advisory paper exercise were asked to submit at least one proposed ETA and planned altitude for each flight at the gateway fix for their chosen airway. A gateway fix is a pre-determined waypoint or navaid along the aircraft's planned route of flight, where DOTS+ can provide metering services in an advisory capacity.

The following gateway fixes were used for the exercise:

- N644 and A466, gateway fix - DI
- L750, gateway fix - ZB
- V390, gateway fix - KN
- G462, gateway fix – ZDN

In addition to the ETA and altitude for the gateway fix, each flight submitted a maximum delay that the flight was willing to accept in order to be slotted as close as possible to the requested gateway time. Optimally, the air carriers were asked to submit two or three options for track, gateway ETA, altitude and delay for each flight listed in priority of preference.

Nine air carriers submitted gateway request forms for 36 flights. Data was inserted for an additional air carrier with four flights based on historic flight data, for a total of ten air carriers and 40 flights. One flight was rejected due to missing data.

Several flights had submitted gateway requests for RVSM altitudes not permitted in the simulation (e.g. FL320). At the specification of IATA, the exercise required flights to plan at FL280, FL310, FL350 or FL390, with the exception that FL280 was not available for flight planning over the *KN* gateway (V390). For the purposes of the simulation, RVSM altitude requests were rounded to the nearest standard altitude.

The addition of RVSM altitudes, if made available, would likely reduce the overall delays calculated in the simulation, however this option was not available in the exercise.

To account for minimal participation by air carriers departing India and Pakistan, use of FL280 was considered primarily restricted for these flights.

Once compiled, the gateway request forms were used by the DOTS+ Track Advisory system to generate simulated Gateway Reservation Lists based on a 10-minute flow rate, and a 15-minute flow rate.

Simulation Results

DOTS+ successfully generated Gateway Reservation Lists for a 15-minute flow rate, and a 10-minute flow rate.

- Using a 15-minute flow rate, DOTS+ reported the following:

NUMBER OF FLIGHTS PUT INTO PROGRAM:	39
NUMBER OF FLIGHTS SCHEDULED ON-TIME:	23
NUMBER OF FLIGHTS SCHEDULED WITH DELAY:	14
MINIMUM DELAY:	1
MAXIMUM DELAY:	14
AVERAGE DELAY TIME FOR DELAYED FLIGHTS	7.5

  Two flights were not placed due to maximum submitted delay times exceeded.[1]

  DOTS+ scheduled on time releases for 62% of submitted flights. The distribution of delayed flights is as follows:

Delays 1 to 5 minutes:	4 flights
Delays 6 to 10 minutes:	7 flights
Delays > 10 minutes:	3 flight

  Of the 37 flights placed, 36 were placed over their primary requested gateway and 31 were slotted at their primary requested altitude.

- Using a 10-minute flow rate, DOTS+ reported the following:

NUMBER OF FLIGHTS PUT INTO PROGRAM:	39
NUMBER OF FLIGHTS SCHEDULED ON-TIME:	29
NUMBER OF FLIGHTS SCHEDULED WITH DELAY:	10
MINIMUM DELAY:	1
MAXIMUM DELAY:	9
AVERAGE DELAY TIME FOR DELAYED FLIGHT:	6.6

  All flights were placed.

[1] In a non-simulated environment, flights not placed would be asked to re-submit gateway requests during a scheduled Track Advisory Negotiation Phase. The Negotiation Phase was not simulated during the paper exercise.

DOTS+ scheduled on time releases for 74% of submitted flights. The distribution of delayed flights is as follows:

Delays 1 to 5 minutes:	2 flights
Delays 6 to 10 minutes:	8 flights
Delays > 10 minutes:	0 flights

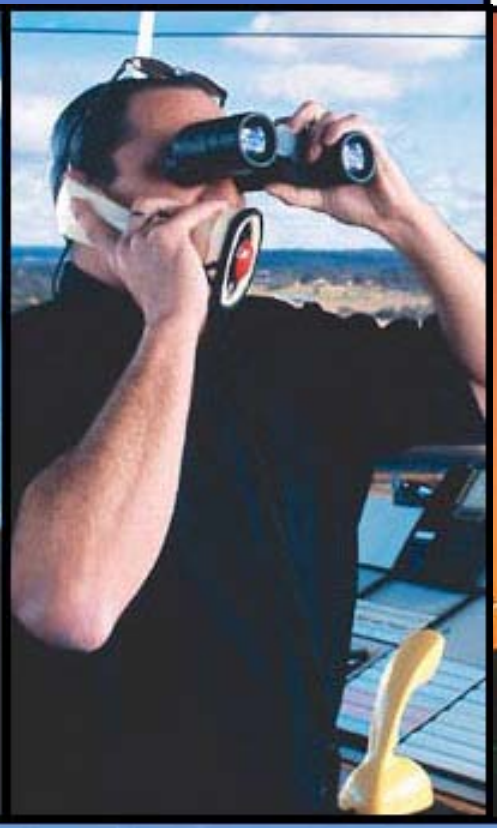
Of the 39 flights placed, 39 were placed over their primary requested gateway and 35 were slotted at their primary requested altitude.

Analysis and Conclusion

Due to incomplete participation, particularly from flights departing India and Pakistan, the paper exercise cannot be considered a full-fidelity simulation. However, the contingency of reserving FL280 for these flights was achieved with minimal impact on participating flights. In the derived Gateway Reservation Lists, FL280 remained available 100% of the time between 2000 and 2400UTC over all gateways except *DI* and *KN*. Over the *DI* gateway, FL280 remained available 75% of the time between 2000 and 2400UTC using a 15-minute flow and 83% of the time using a 10-minute flow. FL280 remained available over all gateways except *KN (V390)* at all times outside of the primary 2000-2400UTC window.

Based on available input for the Bay of Bengal Paper Track Advisory exercise, the DOTS+ system was successful in optimizing traffic sequences at the specified gateways. This optimization was achieved with the vast majority of aircraft released at their primary requested gateway and altitude. The mean delay times for both flow rates represent a significant improvement over ground delays commonly reported by IATA for aircraft in the analyzed traffic pattern.

AIRSERVICES AUSTRALIA PRESENTATION



Presentation on ATFM in Australia
To RVSM TF/24 meeting 11 Nov 2004

Ron Rigney
Airservices Australia

ATFM systems used by Australia

PAST: "Directed Flow"

PRESENT: CTMS/Skyflow
MAESTRO

AND: Discussion on CTMS/Skyflow and early development work for BoB

Directed Flow at Australian Airports

- Manual calculation of arrival sequence and landing time
- "Flow Controller" determines acceptance rate (WX conditions and Runway capacity) – e.g. 2 minute sequence
- Directs flow through Enroute & TMA Controller:-
  - Speed control (cruise and descent)
  - Distance specified – e.g. two jets 15NM in trail x 35 NM
  - Holding with specified Set Course time
  - "Set course time" specified for aircraft departing form smaller airports and in close proximity to major airport
- Instrument training flights included in sequencing "Slot Time"

Limitations of “Directed Flow”

- Prior to introduction of TAAATS and multi-radar tracking, “Directed Flow” was applied only at or inside 160NM (i.e. within pre-existing radar coverage)
- Did not permit early application of speed control/sequencing and so did not allow for efficient application of speed in the total cruise phase of flight
- Controller workload & inefficient Traffic Management

CTMS/Skyflow

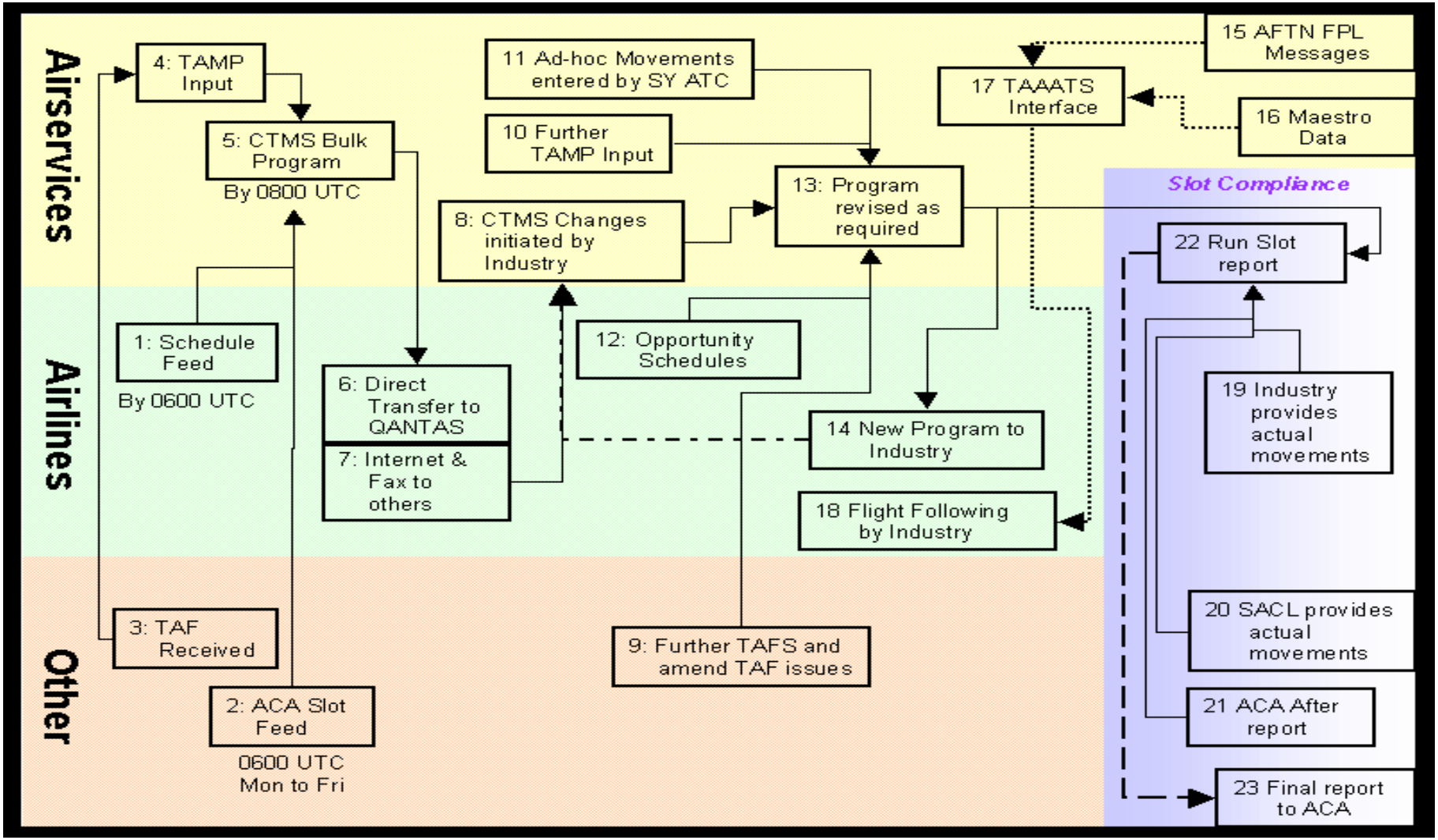
- CTMS = Central Traffic Flow Management System
- Software used to support CTMS is called **SKYFLOW**
- CTMS/Skyflow is primarily used to **match demand with capacity** in Sydney – other Ports use it to look at schedule peaks and troughs – strategic planning tool
- CTMS/Skyflow implemented at Sydney Airport in the late 90's – ahead of the 2000 Olympic Games (peak of 1000 movements per day with curfew in place)
- Operates under agreement with the stakeholders under co-signed Business rules
- Generates a range of reports and traffic details for analysis

CTMS programming process

- The daily program includes the following key data:
  - Runway selection, TAF, type of approach, terminal use, aircraft type, port of departure, scheduled time
- Schedules imported/loaded
- Flights programmed to meet target times – which can be either:
  - Runways;
  - Airport gates; or
  - Airborne gates
- CTMS program issues ground delay as required
- The result is an optimised arrival time for the input capacity for each 30 minute period

CTMS programming process

- The CTMS program outcome is sent to the Airlines
- Flight planning submitted based on final programmed time
- Flights depart on Programmed time
- Tactical Control still required for final management
- Interaction is via interface, web site, fax or telephone (e-mail under development)


Airservices
Airlines
Other
4: TAMP Input
5: CTMS Bulk Program
By 0800 UTC
11 Ad-hoc Movements entered by SY ATC
10 Further TAMP Input
15 AFTN FPL Messages
17 TAAATS Interface
16 Maestro Data
13: Program revised as required
8: CTMS Changes initiated by Industry
Slot Compliance
22 Run Slot report
1: Schedule Feed
By 0600 UTC
12: Opportunity Schedules
6: Direct Transfer to QANTAS
7: Internet & Fax to others
14 New Program to Industry
19 Industry provides actual movements
18 Flight Following by Industry
3: TAF Received
9: Further TAFS and amend TAF issues
20 SACL provides actual movements
21 ACA After report
2: ACA Slot Feed
0600 UTC Mon to Fri
23 Final report to ACA

MAESTRO

- The Eurocat-Maestro system is a proven design and has been successfully operated in Sydney since May 2000
- Maestro has been expanded to include Melbourne and Brisbane ACCs - to optimize traffic handling rates and reduce costs to Industry caused by delays
- Instead of Enroute controllers responding to specific flow directions, controllers are responsible for managing and planning their traffic to ensure that aircraft meet specified Feeder Fix times.
- Flow controller can amend acceptance rate depending on conditions
- Contingency is to revert to manually directed Flow

CTMS/Skyflow and Bay of Bengal

CTMS/Skyflow is a unique Traffic Management System that was developed by Airservices Australia for “Slot Management” at Sydney Airport and later at other major airports

The software is purpose-built and not an “off-the-shelf” product that can be readily upgraded or modified – without significant expense and resources

Withdrawal of CTMS/Skyflow from BoB

✈Airservices Australia has completed a recent review of its plans to offer CTMS/Skyflow as an ATFM tool for the Bay of Bengal and has decided, for a number of reasons, including:

- Lack of “robustness” in its current configuration
- Unfavourable “Business Case” forecast
- Concerns over “Fit for purpose” as an Enroute ATFM tool…..

To remove CTMS/Skyflow from further consideration as an alternative ATFM system tool for deployment in the Bay of Bengal region

Airservices Australia and future BoB ATFM activities

The decision to remove CTMS/Skyflow as an alternative ATFM system for the BoB was taken after full consideration of all the issues facing Airservices Australia

As exemplified through EMARSSH, RVSM and RNP implementation, **Airservices Australia is a willing partner and remains committed** to working with ICAO, States and Organisations in the development of an ATFM system for the Bay of Bengal.

QUESTIONS?