INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE THIRTEENTH MEETING OF THE REGIONAL AIRSPACE SAFETY MONITORING ADVISORY GROUP (RASMAG/13)

BANGKOK, THAILAND, 2 – 5 AUGUST 2010

The views expressed in this report should be taken as those of RASMAG and not of ICAO.

Adopted by RASMAG and
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Page

HISTORY OF THE MEETING

Introduction i
Attendance i
Officers and Regional Office i
Opening of the Meeting i
Documentation and Working Language i

REPORT ON AGENDA ITEMS

Agenda Item 1: Adoption of Agenda 1

Agenda Item 2: Review outcomes of related meetings 1

Agenda Item 3: Reports from Asia/Pacific RMAs and EMAs 10

Agenda Item 4: Airspace Safety Monitoring Documentation and Regional Guidance Material 42

Agenda Item 5: Airspace Safety Monitoring activities/requirements in the Asia/Pacific Region 43

Agenda Item 6: Review and Update RASMAG Task List 57

Agenda Item 7: Any Other Business 57

Agenda Item 8: Date and Venue of the next RASMAG meeting 57

APPENDICES

Appendix A: List of Participants A-1
Appendix B: List of Working and Information Papers B-1
Appendix C: Geographical Location of LHD Reported by Japan C-1
Appendix D: Proposed Amendment to the EMA Handbook D-1
Appendix E: RASMAG List of Competent Monitoring Agency E-1
Appendix F: JCAB RMA Forms F2/F3 Combined with EMA Forms F-1
Appendix G: JCAB Combined RVSM/PBN Database G-1
Appendix H: Monitoring Burden Updated by PARMO H-1
Appendix I: Sample Letter Templates for RMA I-1
Appendix J: Data Link Performance Presentation by the US J-1
Appendix K: Task List K-1

HISTORY OF THE MEETING

1. Introduction

1.1 The Thirteenth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/13) was held in Bangkok, Thailand from 2 to 5 August 2010 at Kotaite Wing of ICAO Asia and Pacific Office.

2. Attendance

2.1 The meeting was attended by 34 participants from Australia, China, Hong Kong China, India, Japan, Mongolia, New Zealand, Republic of Korea, Singapore, Thailand, and the United States. A list of participants is at **Appendix A** to this report.

3. Officers & Regional Office

3.1. Mr. Robert Butcher, Operational Analysis Manager, Safety and Environment Group, Airservices Australia, chaired the meeting. Mr. Kyotaro Harano, Regional Officer ATM, ICAO Asia and Pacific Office, was the Secretary for the meeting.

4. Opening of the Meeting

4.1 Mr. Robert Butcher welcomed participants to the meeting and commented that he was pleased to see the number of State participants who were able to attend. He apologised for the delay in the scheduling of this meeting but indicated this was primarily the result of the fifth meeting of RMACG and other schedule clashes. He noted that there were some important items that needed to be progressed at this meeting including the adoption of the new MMR. Additionally he indicated that from the material provided for the meeting that some RMAs were still experiencing significant issues in obtaining data from States and he suggested that the meeting needed to consider how RASMAG might more efficiently assist some of the RMAs through these problems.

4.2 On behalf of Mr. Mokhtar A. Awan, Regional Director of ICAO Asia and Pacific Office, Mr. Kyotaro Harano, the Regional Officer ATM, welcomed all the participants to the meeting, and conveyed his warm greetings and best wishes for a successful and productive meeting. He commended the efforts by RASMAG over the past few years in monitoring safety for the continuation of reduced separation minima and in making significant progress of the development of safety-related regional guidance material. RVSM operations in the region were showing an improving trend. This was attributable to the concerted effort of RASMAG and the Regional Monitoring Agencies (RMAs). However, since the last meeting, there were still a number of outstanding issues that needed to be addressed such as outstanding Long-Term Height Monitoring Actions and RVSM non-approved flights in RVSM airspace.

5. Documentation and Working Language

5.1 The working language of the meeting as well as all documentation was in English. Thirty working papers and nine information papers were considered by the meeting. A list of papers is included at **Appendix B** to this report.

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REPORT ON AGENDA ITEMS

Agenda Item 1: Adoption of Agenda

1.1 The following agenda was adopted by the meeting:

Agenda Item 1:	Adoption of Agenda
Agenda Item 2:	Review Outcomes of Related Meetings
Agenda Item 3:	Reports from Asia/Pacific RMAs and EMAs
Agenda Item 4:	Airspace Safety Monitoring Documentation and Regional Guidance Material
Agenda Item 5:	Airspace Safety Monitoring Activities/Requirements in the Asia/Pacific Region
Agenda Item 6:	Review and Update of the RASMAG Task List
Agenda Item 7:	Any Other Business
Agenda Item 8:	Date and Venue of the Next RASMAG Meeting

Agenda Item 2: Review Outcomes of Related Meetings

SASP Review of Draft Revision of Doc 9574 and Proposed RASMAG Amendment

2.1 Australia informed the meeting that at the 17th meeting of the Separation and Airspace Safety Panel (SASP/17, May 2010), project team 2 which is responsible for vertical separation standards, reviewed a final draft of the proposed revision of the RVSM manual (Doc 9574). The SASP endorsed the draft document and tasked the Secretariat with processing the document for publication.

2.2 Subsequent to the SASP meeting, the RASMAG chairman was made aware that there remained an opportunity to provide some additional amendments to the Doc 9574 revision as processing to publication was not expected to be completed prior to the next SASP meeting in November 2010. The meeting was provided with suggested wording in consideration of RASMAG task 12/1, which highlighted the benefits of establishing Scrutiny Groups as part of the safety management for RVSM airspace.

2.3 The meeting thanked the Chairman for the paper and reviewed the wording in some detail. The United States supported the intent of the additional wording, highlighting that the importance of a Scrutiny Group could not be overlooked as they achieve commonality of procedures across a region, and enable the safety cycle to be enhanced. As a result of this discussion, additional wording was developed for the amendment and agreed to by the meeting. The proposed amendment is detailed below:

RVSM Manual section

5. ASSESSMENT AND EVALUATION OF OPERATIONAL ERRORS AND IN-FLIGHT CONTINGENCIES

5.1 As set out in 1.1.10 and ~~6~~5.3.1 to ~~6~~5.3.3 of the main text of this manual, the level of collision risk resulting from errors in ATC instructions and emergency procedures in RVSM airspace needs to be assessed in addition to that resulting from technical height-keeping deviations. The types of errors and their possible consequences may vary from region to region.

5.2 To assist in the assessment of large height deviations a regional or State based Scrutiny Group should be established to support the RMA monitoring function. A Scrutiny Group is comprised of operational and technical subject matter experts that support the evaluation and classification of LHDs. A Scrutiny Group is an invaluable component of safety management as it enables the focussing of operational expertise to analyze the circumstances relevant to operational errors and to link the types of events in an airspace to trends in safety-related performance. During any analysis of the data and performance trends from an operational perspective, the Scrutiny Group should consider the effect of standing procedures and practices and review these in relation to accepted best practice.

5.3 The activities undertaken by a Scrutiny Group directly supports the principles of safety management by "completing the safety cycle". This is accomplished by synthesizing raw data in relation to current practices into recommendations for change of policies, practices and procedures which improve the safety of the airspace. Recommendations made by a regionally established Scrutiny Group typically proceed through the hierarchy of regional groups to the relevant PIRG for action by States. Where a State-based Scrutiny Group is established, recommendations from that group will normally be coordinated directly to participants in the airspace, such as operators and relevant authorities.

5.4 The responsible RMA(s) should coordinate with the PIRG to establish a Regional Scrutiny Group, or with relevant State organizations to establish a State based Scrutiny Group. Further guidance on the establishment of a Scrutiny Group is contained in Doc XXXX, '*Manual of Operating Procedures and Practices for Regional Monitoring Agencies in relation to the use of a 300 (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 inclusive*'.

5.5 The following briefly summarizes two approaches to ~~their~~the assessment of operational errors and inflight contingencies (that have been developed in the context of the NAT and the EUR Regions, for guidance) ~~respectively. For more information, see the regional documentation.~~

2.4 The meeting thanked the Chairman and the United States for the proposal and asked the Chairman to directly coordinate the wording to the SASP at its next meeting in November 2010.

Outcome of the Sixth Meeting of PBN Task Force (PBN/TF/6)

2.5 The meeting reviewed the outcome of the Sixth Meeting of PBN Task Force (PBN/TF/6, February 2010). The full report of the meeting is placed at the Regional Office website at: http://www.icao.or.th/meetings/2010/pbn_tf6/index.html.

2.6 The meeting noted that PBN/TF/6 was briefed about the significant PBN initiatives being worked or coordinated by the ICAO PBN Programme Office. PBN/TF/6 was also briefed about the work programme related to PBN implementation in the region and the global initiatives taken on this subject. PBN/TF/6 was informed of the completion of the initial draft of the PBN Operational Approval manual and that the PBN Study Group, in the meeting held in September 2009, adopted the following decisions to give direction to the global PBN implementation:

i) Development of a navigation specification for Satellite Based Augmentation System (SBAS) and its inclusion in the PBN Manual as part of the RNP Approach navigation specification;

ii) Development of an RNP 2 navigation specification for en-route continental application, including remote continental;

iii) Application of RF turns outside final approach in RNP Approach, advanced RNP and Basic - RNP 1 navigation specifications; and

iv) Development of an Advanced RNP navigation specification.

2.7 An amendment to the PBN Manual is expected to be ready by the end of 2010, incorporating the above decisions. PBN/TF/6 also reviewed the progress achieved in PBN implementation in the en-route environment and agreed to facilitate harmonization of the State PBN Implementation Plans. IATA agreed to serve as a coordinator of the harmonization activities. PBN/TF/6 concluded that IATA and the volunteering States should develop a recommendation report for State plan harmonization to be presented to the next PBN/TF meeting. While reviewing Version 1 of the Asia/Pacific Regional PBN Implementation Plan, States were urged to develop their State plans in accordance with the regional PBN Implementation Plan to ensure harmonized transition and implementation at the regional level.

2.8 The meeting discussed the report of PBN/TF/6 and the United States noted that the PBN TF has been in progress for sometime and that the work plan will continue for the foreseeable future. United States suggested that possibly RASMAG should assist or monitor PBN/TF activities by:

1. Pursuing the inclusion of more specific information on aircraft avionics requirements to realise separation benefits possibly in work being progressed by SASP;
2. RASMAG tracking the development of RNP 2 continental and remote continental applications. and its extension into RNP 2 oceanic specifications; and
3. Encouraging the users of the system to provide the relevant information regarding navigation capability so that the ANSPs can use it more efficiently for the end users benefit.

2.9 The meeting agreed with these views.

Summary Report of the 12th Meeting of the FANS Implementation Team for the Bay of Bengal (FIT-BOB/12)

2.10 The meeting noted the summary report of the 12th Meeting of the FANS Implementation Team for the Bay of Bengal (FIT-BOB/12, February 2010) which was held at the Regional Office in conjunction with the Second Meeting of the Bay of Bengal Reduced Horizontal Separation Implementation Task Force (BOB-RHS/TF).

Report on ADS-C/CPDLC Bench Testing with Chennai and Mumbai Centres

2.11 Boeing informed FIT-BOB/12 that the avionics suite or "bench" simulates full aircraft systems capabilities from an ADS and CPDLC standpoint. Once connected to either ARINC or SITA's ACARS network, the bench can logon to any FANS ground automation system around the world. Once connected, test bench aircraft appear just like any other flight operating in that airspace.

2.12 FIT-BOB/12 noted that ATSUs were being encouraged to automate the connection sequence. The CPDLC connection response from the aircraft should be used to provide the connection status and the connection with the aircraft is not established until the Connection Confirm (CC1) is received from the aircraft.

2.13 Ground automation systems should use the uplink message assurance (MAS) messages to inform controllers that a message was not received by the aircraft. ATSUs were encouraged to increment the uplink Message Identification Number (MIN) from 0 to 63 and to include the optional UTC time stamp with uplink messages.

Summary Report of the 10h Meeting of the FANS Implementation Team for Southeast Asia (FIT-SEA/10)

2.14 The meeting noted the summary report of the 10th Meeting of FANS Implementation Team for South-East Asia (FIT-SEA/10, May 2010).

Central Reporting Agency

Report of FIT-SEA

2.15 Since FIT-SEA/8 (May 2008, Bangkok), Central Reporting Agency (CRA)-Japan had not received any problem reports (PRs) for 24 months from Singapore and Viet Nam. However, Singapore subsequently submitted eight PRs covering the period of past 12 months just before FIT-SEA/10.

2.16 FIT-SEA/10 questioned why PRs were not widely reported as compared with other regions. FIT-SEA-10 encouraged the stakeholders to provide reports of any anomalies that they might experience. Prompt and full reporting of such events to the FIT-SEA CRA will allow any deficiencies to be identified and rectified.

Consideration of the Termination of FIT-CRA Services by CRA-Japan

2.17 Japan advised FIT-SEA/10 that they would not be able to act as the FIT-SEA CRA after March 2011. FIT-SEA/10 appreciated Japan and CRA-Japan for their services graciously provided free of charge for over three years and recognized the reason why Japan was withdrawing the FIT-SEA CRA services.

2.18 CRA-Japan, however, noted that support for data link implementation in the Manila flight information region (FIR) would be vital and a formal CRA for FIT-SEA should be established as soon as possible in order not to stall the implementation plans. States were urged to bring this issue to the attention of their relevant authority and be ready for further discussion at the ATM/AIS/SAR Sub-group and the APANPIRG meetings, bearing in mind the time constraint that was needed to establish a proper CRA. FIT-SEA/10 requested the Secretariat to submit a working paper to the 20th meeting of ATM/AIS/SAR Sub-Group (ATM/AIS/SAR/SG/20, July 2010) for further deliberation on this issue.

Review of ADS/CPDLC Operations in Singapore FIR

2.19 In accordance with the *FANS Operations Manual* (FOM), the monthly periodic status reports were prepared and submitted regularly to CRA-Japan. The reports showed that the data link performance was within the FOM criteria except for downlinks. As previously noted at FIT-SEA/9 (May 2009), there were performance issues for downlink in both the Ho Chi Minh and the Singapore FIRs last year. This was a known performance issue that was attributed to the B777 types which formed a majority of the aircraft types operating FANS in the Singapore FIR.

2.20 In February 2010, Singapore carried out a detailed study of the occurrences of the marginal downlink performance. Most of the occurrences were found to be in the VHF-SATCOM transition areas. The results validated that the poor downlink performance was correctly attributed to the B777 problem. Singapore will continue to monitor this issue and provide an update at the next meeting.

Preparations for ADS/CPDLC Trial Operation in the Manila FIR

2.21 Philippines informed FIT-SEA/10 of their Phase 1A of the operational trial plan, which would involve a CPDLC trial with limited airline participants in parallel use of HF voice communication and validation of ADS reports using the new Manila ACC system. A detailed presentation of the preparations for the data link trials was provided. The ADS/CPDLC refresher course for Manila ACC controllers was carried out as planned in 2009.

2.22 FIT-SEA/10 advised the Philippines that the implementation of data link systems should be closely coordinated with FIT and CRA. Further, the Secretariat advised the Philippines to start data collection of the system performance as early as possible to enable a FIT-SEA meeting to be held three months before the Phase 1B, i.e. October 2010 given the Phase 1B should start in January 2011. If the FIT-SEA meeting finds that their system performance meets the FOM criteria, subsequently an AIC and/or AIP Supplement will be issued with two AIRAC cycles to announce the commencement of the Phase 1B where all the aircraft will use CPDLC as a primary means of communication. In total, it will be at least six months from the beginning of the data collection to the commencement of the Phase 1B. The Philippines agreed to consider the suggestion.

2.23 The meeting discussed the FIT-SEA/10 report and in particular expressed concerns that the CRA activity currently being undertaken by Japan must continue when that State stops providing these services. The Chairman suggested that possibly RASMAG needed to put a conclusion to APANPIRG to highlight the need for this role to continue after Japan completes its term. United States agreed with this view, highlighting that there is a need to ensure the performance of the communications links as this work is a very important element in maintaining the safety of the system. New Zealand commented that the information reported by the CRAs/FITs was piecemeal and suggested that RASMAG should ask for some level of standardisation to reporting. This will enable RASMAG to compare similar data sets across the region. The meeting agreed with this view and the United States identified that Appendix D of the GOLD specifies the format to be used for such reporting and that the Pacific FIT/CRAs are already standardising on this. The Secretariat was tasked to convey the concerns and views expressed by RASMAG to ATM/AIS/SAR/SG and FIT-SEA.

Review Outcomes of the 17th Meeting of South-East Asia ATS Coordination Group (SEACG/17)

2.24 The meeting noted the outcome of the 17th Meeting of South-East Asia ATS Coordination Group (SEACG/17, May 2010) which reviewed the outcomes of RASMAG/12 on, among others, PBN approvals in Field 10 of flight plans as follows.

PBN Approvals Information on Flight Plan

2.25 RASMAG/12 discussed the need to include all PBN approval types in the flight plan and to make use of the flight plan form Field 18 as the means to include the PBN approval types. Australia noted that the entry of PBN approvals information in Field 18 was published in the Australia AIP as a requirement in Australia, and understood that other States such as the United States had also made such a requirement. The meeting noted that RASMAG had endorsed the proposal to use Field 18 of the flight plan on a regional basis to identify an aircraft's PBN approvals.

2.26 SEACG/17 noted and appreciated the work undertaken by RASMAG/12, however, in discussing the issue of the use of Field 18 of flight plans, IATA expressed concern about the high workload of users by putting the requirement in place. IATA commented that it was not so easy at this time for airline operators to check all the PBN approvals for each aircraft and make sure correct information is filed in Field 18. In the absence of strong justification from the workload-benefit perspective, SEACG/17 did not support the suggestion by RASMAG/12.

2.27 The meeting noted the views of SEACG/17 in regards to the provision of PBN approvals information in Field 18 of flight plans. Comments were made that it was difficult to understand why undertaking this task was being avoided as many operators already provide that information in that field as required for operation in certain FIRs. The Secretary commented that the SEACG meeting was of the view that within the SE Asian region there was no reason to provide the information until the new flight plans became effective in 2012.

Review Report of ATM/AIS/SAR/SG/20

2.28 The meeting noted the outcome of ATM/AIS/SAR/SG/20, which reviewed the outcomes of RASMAG/12 as well as the APANPIRG/20 report and other ATM/AIS/SAR-related meetings. A full copy of the meeting report is available on the website of the Regional Office at http://www.bangkok.icao.int/ under the 'Meetings' menu.

Regional Performance Framework and Metrics

2.29 The *Manual on Global Performance of the Air Navigation System* (Doc 9883) provides a step-by-step approach to performance-based planning on the basis of the Key Performance Areas (KPAs) identified in the ATM Operational Concept. It was recognized that a common set of performance metrics for all regions should be available and States would carry on the existing four APAC Metrics.

Review and Progress the Tasks Assigned to the ATM/AIS/SAR/SG by APANPIRG, and Consider Problems and Make Specific Recommendations

Proposed Changes to the Operational Letter of Agreement between States for the Monitoring of Aircraft Navigation Errors in the South China Sea Area

2.30 South East Asia Safety Monitoring Agency (SEASMA) has been set up as the En-route Monitoring Agency (EMA) to provide airspace safety assessment and monitoring services to support the introduction and continued safe use of horizontal-plane separation minima in the South China Sea area. In light of this, the need to revise the current Letter of Agreement (LOA) was identified to reflect the change in the name of monitoring authority from the Civil Aviation Authority of Singapore (CAAS) to SEASMA. ATM/AIS/SAR/S/20 requested State representatives to take the LOA back to their States and provide comments to Singapore. It was agreed that the LOA among States concerned should be signed during APANPIRG/21 to be held in September 2010 in Bangkok.

Traffic Movements and GNE Reports June 2009 to May 2010 on the Six Designated Monitored Areas in the South China Sea

2.31 Singapore informed ATM/AIS/SAR/SG/20 that in April 2010, Singapore Area Control Centre (ACC) reported one large lateral deviation (LLD) of 20 NM to the left of N892 which was observed on ADS/CPDLC. A lack of coordination between ATC-unit to ATC-unit transfers of control responsibility was the contributing factor towards this LLD. No further lateral and longitudinal errors were reported in the monitored area during the period under review.

Global ATS Inter-Facility Data Communications (AIDC) Interface Control Document (ICD)

2.32 The United State Federal Aviation Administration (FAA) drafted a *Global Interface Control Document (ICD) for ATS Inter-Facility Data Communications (AIDC)* which was provided to the Informal Pacific ATC Coordinating Group (IPACG) for review and comments. As ATM/AIS/SAR/SG/20 did not have the expertise, participants were requested to take the information back to respective States for review and to provide resulting comments to Ms. Karen Chiodini (email: Karen.L.Chiodini@faa.gov) by 31 August 2010. With respect to the approval procedure of the document, it was informed that the same procedure undergone for approval of the *Global Operational Data Link Documents* (GOLD) would be also applicable for the Global ICD. The document, however, was expected to be completed for consideration by APANPIRG in 2011, and the meeting felt that it was too early to formulate a Conclusion.

Horizontal En-route Monitoring Agency and Operational Letter of Agreement for the Monitoring in the Arabian Sea, the Bay of Bengal and the Indian Ocean

2.33 The meeting noted that during a Bay of Bengal Reduced Horizontal Separation Implementation Task Force (BOB-RHS/TF) meeting, India advised the Task Force that, taking into consideration the amount of airspace within their FIRs in both the Arabian Sea and the Bay of Bengal, they were prepared to establish an EMA to cover all routes to which 50 NM longitudinal separation will be applied. Singapore, who is responsible for the EMA service for the South China Sea area, offered to share their experience with India in this regard.

Review Outcomes of RASMAG/12

2.34 ATM/AIS/SAR/SG/20 had a lengthy discussion on the current Central Reporting Agency (CRA) arrangement. During the discussion, it noted that the CRA arrangements were made on an individual sub-regional basis, and the arrangements and the mechanisms differed from sub-region to sub-region. ATM/AIS/SAR/SG/20 felt that a region-wide safety monitoring arrangement for data link operations with oversight by RASMAG would be preferred. Accordingly, the meeting formulated the following Draft Conclusion for consideration by APANPIRG:

Draft Conclusion SG 20/13 – CRA Arrangement under RASMAG Responsibility

That, in light of the variation of the CRA arrangement across the region, RASMAG be invited to provide guidance and oversight in the arrangement for the establishment and the operations of CRA in order to achieve a sustainable mechanism for the region.

2.35 The meeting reviewed the Draft Conclusion above and agreed that communication and surveillance capability had a vital role to play in ensuring the continuing safety of the region's airspace. The meeting, however, was of view that while RASMAG's responsibility is to oversight safety in the region, the arrangement for the establishment and operations of CRAs is the responsibility of the FIT and ATM/AIS/SAR/SG.

Fifth Meeting of the Regional Monitoring Agency Coordination Group (RMACG/5)

2.36 The Chairman provided a brief overview of the outcomes of the fifth RMA Coordination Meeting (RMACG/5, May 2010) held in Atlantic City, USA. The meeting was informed that the main items of discussion were:

- China RMA provided an assessment of RVSM non-approved aircraft operating in Chinese RVSM airspace during the period of December 2009. Fifty-two operations were identified in the traffic sample for which the RVSM approvals database indicated the aircraft is RVSM non-approved but flight plan data indicated that the aircraft had 'W' in Field 10.

- The meeting agreed that all RMAs experience problems with States reporting approvals and data presented by China RMA is representative of all Regions. It was also noted that some States might not pay as much attention to certain approved aircraft types with the assumption that the aircraft must be approved. It is also assumed by some States that safety monitoring does not continue after RVSM implementation.

- The meeting agreed to explore methods of raising the visibility and importance of maintaining RVSM approvals, noting particular problems with obtaining military approvals. Options should be explored to engage ICAO headquarters and regional offices to the maximum extent possible. Additionally, it was noted that the introduction of long-term monitoring requirements is a good opportunity to raise awareness.

- All RMAs present agreed that actions should be taken against operators of unapproved operations and evidence of actions taken will reduce occurrences. ARMA noted that, in some cases, contacting the operator directly is more effective than contacting the CAA regarding unapproved operations.

- The United States introduced a paper that presented a comparison of the results of the average altimetry system error (ASE) for aircraft groups obtained from the Aircraft Geometric Height Measurement Element (AGHME) and European Height Monitoring Unit (HMU) systems. The comparison demonstrates that ASE results obtained from the AGHME system are consistent with those obtained from the European monitoring system. Differences in performance that may indicate modifications to monitoring groups. The comparison is useful for identifying fleet compositions between Regions.

- The meeting agreed that this is a desirable method of comparing monitoring systems and encouraged analyses of this type to continue. The meeting also agreed that the comparisons being made support the development of future monitoring systems. The NARMO/ PARMO were encouraged to continue to provide updates to this analysis at future meetings.

- The United States also provided a paper giving an updated estimate of the vertical overlap probability for use in the NAT vertical collision risk model based on recent estimates of the aircraft population, reports of large height deviations which were found to be unrelated to operational causes, aircraft height-keeping performance data, and altitude deviation data. It was noted that the last estimate was developed prior to the implementation of the RVSM in 1997.

- The United State presented a paper that describes the process used to monitor measurements of ASE data and identify trends. An automated process for analyzing ASE to identify atypical performance and trends was developed through a cooperative agreement with Rutgers University in the United States. ASE data can be analyzed by monitoring site, operator, aircraft type, airframe (registration number), and/or or Mode S address. In addition, the data can be filtered by date range and by minimum number of observations. ASE trends are then identified by observing the estimate of the ASE drift or the slope provided by the linear regression model.

- The meeting was presented with a Gulfstream III (GLF3) ASE case study that showed the circumstances of August 2009 ASE measurements with magnitudes near minus 800 feet. The airframe had a non-standard airframe modification. The airframe has been grounded until satisfactory airworthiness remediation can be demonstrated to FAA Airworthiness authorities. The meeting noted that the aircrew would not be aware of the large ASE, ATC would not detect the large ASE and TCAS would not consider the large ASE. It was also noted that as analysts, the RMA staff will likely experience initial disbelief about the validity of such a large ASE measurement.

- The meeting spent sometimes reviewing comments and proposals related to the future revision of the Regional Monitoring Agency (RMA) Manual.

- The United States provided information regarding the onboard integrated data collection capability for purposes of RVSM monitoring on the new Boeing B787. This will be the first aircraft type equipped with this functionality.

- An update on the research activity between the AAMA and the FAA in relation to validating the use of ADS-B as a means for measuring ASE was provided. The information provided detailed Altimetry System Error (ASE) results for all flights in continental Australian RVSM airspace during a ten-day period. ASE results are given from individual ADS-B reports rather than mean ASE values for consolidated track segments. Further work is needed to determine the cause of the apparent geographical effect on the ASE estimates.

- The meeting encouraged the AAMA and FAA to continue the research into using ADS-B as a means of height monitoring.

- Significant discussions took place regarding proposed changes to the list of Monitoring Groups and the Minimum Monitoring Targets which are proposed by the European RMA. The changes consist of adding new aircraft types, modifications to two existing groups and an update to aircraft series. The meeting reviewed and agreed to the proposed changes and agreed to a new standardised MMR to be appended to the RMA Manual.

- The meeting discussed the assignment of States and FIRs and assignment to RMAs. The meeting agreed that all RMAs have a responsibility to report to their respective Planning and Implementation Regional Group (PIRG) and a question was raised at to the current status of the South Atlantic RMA (SATMA). It was noted that communication has been difficult with SATMA and concerns exist over events that may be LHDs in the FIRs assigned to SATMA. The meeting agreed that the status of SATMA and its available resources to support RMA responsibilities should be clarified.

2.37 The meeting thanked the Chairman for the information and MAAR asked whether previously registered and monitored aircraft can use the monitoring completed under the previous registration where the same aircraft changes its State of registration. The United States stated that in the United States such requests are treated by putting the responsibility back to the regulator. Also when an aircraft changes hands the airframe could be modified and affect altimetry system so that fact alone has to be considered. As a result they believed that the State regulator had to make those decisions. MAAR appreciated the comments from the United States but indicated that when they have suggested an operator needs to check with its State regulator in this regard, the regulator then comes to MAAR asking similar questions to those of the operator and whether the airframe should be monitored or not. MAAR stated that they are not convinced that some State regulators always fully understand the requirements for the approval of RVSM. The United States further commented that we must trust the regulatory authorities and help those we know need assistance, however the signed approval document should be accepted. Our duty as RMAs must be to provide any evidence of ASE non compliance to the regulator and assist them in getting the aircraft back to within limits.

2.38 With regard to the revised MMR agreed at RMACG/5, the meeting recalled that Conclusion 20/20 would be remain in force until LTHM requirements in Annex 6 become effective in November 2010. The meeting was also informed that Annex 11 provisions and those of Doc 9574 require system performance monitoring on a regional basis to provide evidence of stability of ASE. In addition, the revised MMR agreed by RMACG/5 is a means to translate the requirement of Annex 6 into the operational environment. Therefore, RASMAG decided that the revised MMR agreed by RMACG/5 will remain as the basis for maintenance of LTHM requirements in the region after November 2010 as follows:

Decision – Use of the Revised MMR in LTHM for the Region

That, in order to ensure the continued safe use of RVSM airspace within Asia/Pacific region, the revised MMR endorsed by RAMCG/5 be used as the regional basis for maintenance of LTHM requirement after November 2010.

2.39 The Secretariat was tasked to update the LTHM impact statement to incorporate the revised MMR. RMAs were requested to review the monitoring burden based on the revised MMR by 30 August 2010.

Agenda Item 3: Reports from Asia/Pacific RMAs and EMAs

AAMA's RMA activities

Australian, Nauru and Solomon Islands Airspace

3.1 Australia presented the results of the safety assessments of the Brisbane, Honiara, Melbourne and Nauru FIRs undertaken by the Australian Airspace Monitoring Agency (AAMA). The meeting was informed that the assessment covered the 12 month period ending on 30 April 2010, using traffic sample data (TSD) for December 2009. Additionally it was explained that this was the first report to RASMAG by the AAMA where incident reports for the Honiara and Nauru FIRs are incorporated into the Australian assessment due to the low number of incidents and flight hours. Additionally the Australian air navigation service provider is the controlling authority for the upper airspace in these FIRs.

3.2 In completing the assessment, the AAMA assessed Large Height Deviations (LHDs) identified through the Airservices Australia Electronic Safety Incident Reporting (ESIR) system or provided by aircraft operators. The total number of minutes calculated for the period 1 May 2009 to

30 April 2010 was 273.5 drawn from 69 assessed non-NIL reports. The meeting noted that the calculated risk value has increased significantly from the value of 3.12 x 10^{-9} that was reported to RASMAG at its last meeting covering the period to the end of November 2009. Australia informed the meeting that the resultant increase in risk had primarily been the result of an increase in the number of Category A and B type LHDs and of some high duration incidents reported in January 2010.

3.3 The Australian report identified that the duration of Category E Coordination Errors continued to be a source of risk in the airspace along with Category D loop error reports. The meeting was informed that the assessment for the Australian airspace resulted in an estimation of the total risk as 5.66 x 10^{-9} fatal accidents per flight hour, which does not satisfy the agreed TLS values of no more than 2.5 x 10^{-9} (technical risk) and 5.0 x 10^{-9} (overall risk) 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. Australia commented that the further assessments for the months of May and June 2010 showed that the current assessed risk has increased to 6.06 x 10^{-9}. While this value continues above the TLS, Australia was satisfied that action to resolve the issues identified from the operational errors was being effectively managed.

3.4 **Table 1** below summarizes the results of the airspace safety oversight in terms of the technical, operational, and total risks for the RVSM implementation in the Australian airspace.

Australian, Nauru and Solomon Islands RVSM Airspace – estimated annual flying hours = 570,594.64 hours *(note: estimated hours based on December 2009 traffic sample data)*			
Source of Risk	**Lower Bound Risk Estimation**	**TLS**	**Remarks**
Technical Risk	0.028 x 10^{-9}	2.5 x 10^{-9}	Satisfies Technical TLS
Operational Risk	5.63 x 10^{-9}	-	-
Total Risk	**5.66 x 10^{-9}**	5.0 x 10^{-9}	**Above Overall TLS**

Table 1: Risk Estimates for the RVSM Implementation in Australian, Nauru and Solomon Islands Airspace

3.5 In addition, **Figure 1** below presents the trends of collision risk estimates for each month using the appropriate cumulative 12 month interval of LHD reports since 1 May 2009.

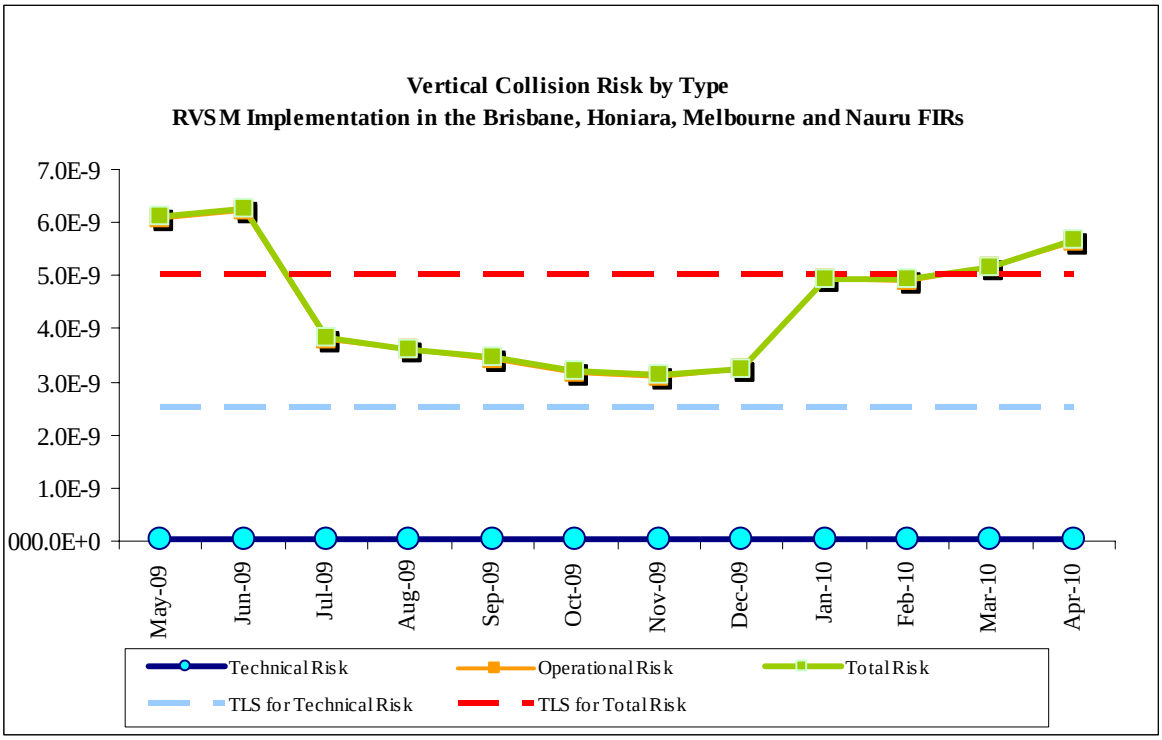

Figure 1: Trends of Risk Estimates for the Australian, Nauru and Solomon Islands RVSM Airspace

3.6 The meeting was informed that the AAMA continued to establish a monthly risk value that provides a real-time picture of actual risk without the effect from historical high-time errors resident within the 12 month data sample. With this type of monthly assessment, the AAMA had been able to assess RVSM risk by showing individual LHD contribution to the calculated monthly risk as detailed in **Figure 2** below. The data shows that the monthly risk for April 2010 increased in comparison with the previous few months as a result of an increase in Categories A, B and E LHD reports. The meeting was informed that while the figure below indicated a heightened monthly risk since January 2010, the most recent estimation of monthly risk undertaken in June 2010 indicates the TLS is being met.

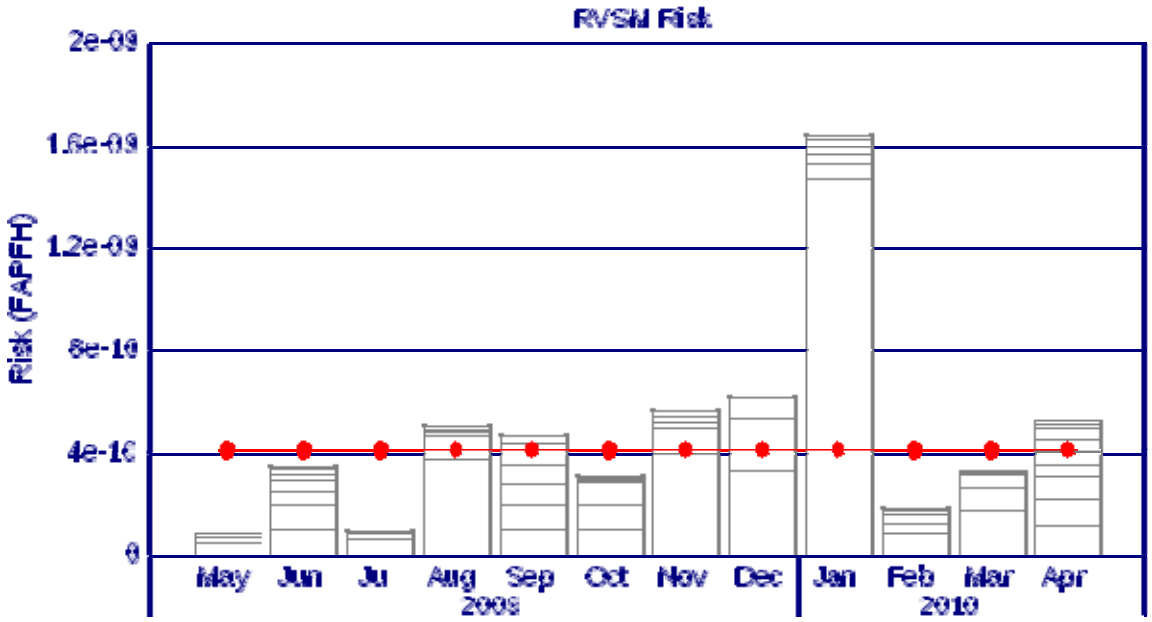

Figure 2: Monthly Risk Estimates for the Australian, Nauru and Solomon Islands RVSM Airspace

3.7 The meeting noted the outcome for the Australian airspace in terms of estimated risk, noting the increased risk since reported in November 2009 and that currently the 12 month risk estimation was not meeting the Target Level of Safety (TLS). The meeting thanked the AAMA for its continuing good work in the provision of safety assessments. The United States noted the block clearance issue identified by Australia in LHDs is also a problem for the NAT and Pacific airspaces. Reasons for these types of LHDs is believed to be related to conditional clearances, or clearance requiring a climb at time or position, or the briefing between crews changing watch on the flight deck. The United States suggested that RASMAG might want to make a recommendation/conclusion to highlight these issues. Australia suggested that maybe further data should be provided for consideration before making a recommendation. The meeting agreed with that proposal.

Indonesian Airspace

3.8 Australia presented the results of a safety assessment for the Jakarta and the Ujung Pandang FIRs. Australia informed the meeting that the assessment covered the 12 month period ending on 30 April 2010, using traffic sample data for the month of December 2009.

3.9 The meeting was informed that in undertaking the assessment, the AAMA had received a number of LHD reports from the Indonesian air navigation service providers (ANSPs). Additionally, the AAMA had access to a number of reports provided by Australia that included possible risk bearing LHDs relative to the Jakarta and Ujung Pandang FIRs. Assessment of these reports was made from the perspective of their impact within the Indonesian airspace.

3.10 The meeting was informed that a total of 29.0 minutes duration was assigned to the 11 non-NIL LHDs identified which is a significant decrease in assessed duration compared to that of 98 minutes last reported to RASMAG. The LHDs were summarized as follows:

- A spike identified in March represents a single Category L LHD with a total duration of 15 minutes. This was a significant change from the previous month's report where two Category L LHDs were included in the data set with a cumulative total duration of 60 minutes.

- Nine Category E – ATC coordination error reports were identified in the 12 month data sample. Seven of these reports related to coordination errors between Jakarta and Makassar Area Control Centres (ACCs). Two other reports related to coordination errors from Brisbane FIR and had an assessed duration of one minute each.

- One Category A report– 'Flight crew failing to climb or descend the aircraft as cleared' was assessed in the data sample. This report was identified in the Australian incident data and related to an aircraft failing to meet a level requirement prior to transfer to the Ujung FIR. The risk was assessed inside the Ujung FIR as duration of two minutes.

- Three Category J reports – 'TCAS resolution advisory' were assessed. Of significance was the fact that these reports all related to the same incident near Ambon in February 2010, and were risk assessed on the basis of the number of levels crossed without clearance. These reports added significantly to the risk calculated for the airspace.

3.11 **Table 2** below summarises the number of LHD occurrences and associated LHD duration (in minutes) by LHD category from 1 May 2009 inclusive.

LHD Category Code	LHD Category Description	No. of LHD Occurrences	LHD Duration (Min)
A	Flight crew failing to climb/descend the aircraft as cleared	1	2.0
B	Flight crew climbing/descending without ATC Clearance	0	0.0
C	Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance etc)	0	0.0
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message)	0	0.0
E	Coordination errors in the ATC to ATC transfer or control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters)	9	12.0
F	Coordination errors in the ATC to ATC transfer or control responsibility as a result of equipment outage or technical issues	0	0.0

G	Deviation due to aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure)	0	0.0
H	Deviation due to airborne equipment failure leading to unintentional or undetected change of flight level	0	0.0
I	Deviation due to turbulence or other weather related cause	0	0.0
J	Deviation due to TCAS resolution advisory, flight crew correctly following the resolution advisory	0	0.0
K	Deviation due to TCAS resolution advisory, flight crew incorrectly following the resolution advisory	0	0.0
L	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC misinterpretation of flight plan)	1	15.0
M	Other – this includes situations of flights operating (including climbing/descending) in airspace where flight crews are unable to establish normal air-ground communications with the responsible ATS unit.	0	0.0
	Total (December 08 – November 09)	**11**	**29.0**

Table 2: Summary of LHD Occurrences and Duration by LHD Category

3.12 **Table 3** below summarizes the results of the airspace safety oversight in terms of the technical, operational, and total risks for the RVSM implementation in the Indonesian airspace.

Indonesian RVSM Airspace – estimated annual flying hours = 537625.57 hours *(note: estimated hours based on December 2009 traffic sample data)*			
Source of Risk	**Lower Bound Risk Estimation**	**TLS**	**Remarks**
Technical Risk	0.761×10^{-9}	2.5×10^{-9}	Satisfies Technical TLS
Operational Risk	4.67×10^{-9}	-	-
Total Risk	**5.43×10^{-9}**	5.0×10^{-9}	**Above Overall TLS**

Table 3: Risk Estimates for the RVSM Implementation in Indonesian Airspace

3.13 In addition, **Figure 3** below presents the trends of collision risk estimates for each month using the appropriate cumulative 12 month interval of LHD reports since May 2009.

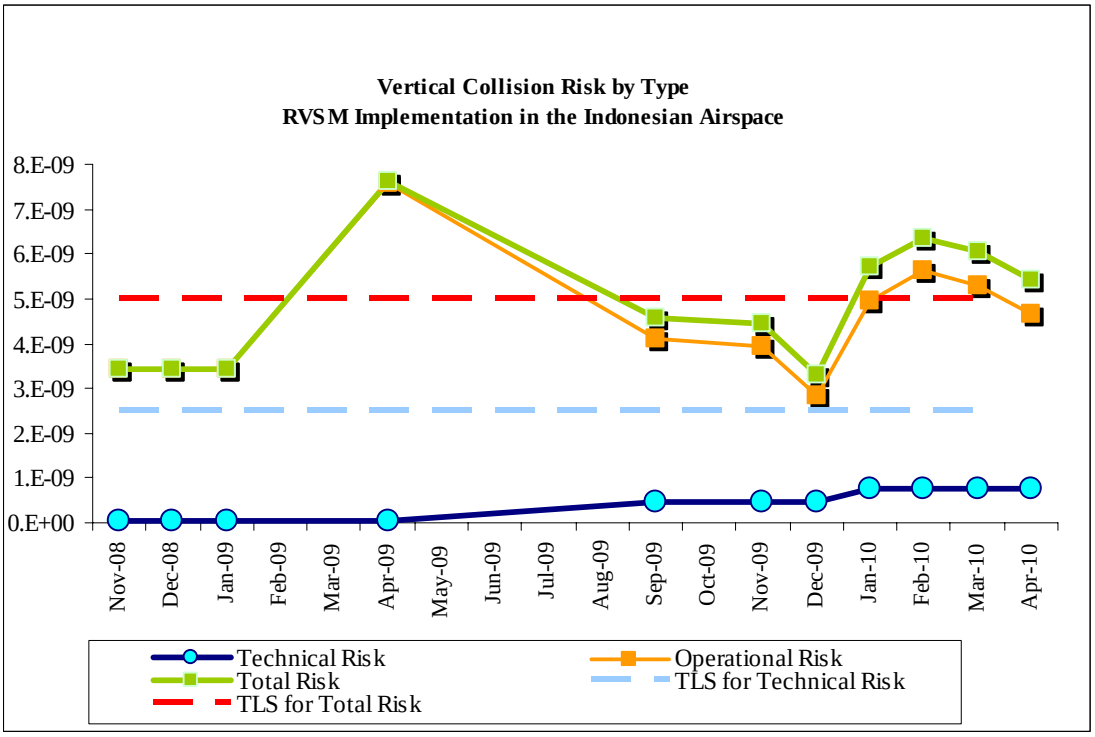

Figure 3: Trends of Risk Estimates for the Indonesian Airspace

3.14 The meeting thanked Australia and particularly the AAMA for its continuing efforts to assess the Indonesian airspace and for its close coordination with Indonesian authorities to enhance the data required for the RMA to undertake its activities. The meeting was pleased to note the reduced risk for the airspace albeit that it is marginally in excess of the TLS.

Papua New Guinea Airspace

3.15 Australia presented the results of a safety assessment undertaken by the AAMA for the Port Moresby FIRs. Australia informed the meeting that the assessment covered the 12 month period ending on 30 April 2010, using traffic sample data for the month of December 2007.

3.16 Australia informed the meeting that the TSD for the month of December 2007 of aircraft operating in the Papua New Guinea airspace was used to assess the safety of RVSM airspace. More recent data had been made available but quality issues with the data had meant that it was currently not available for processing. These issues would be further explored and resolved by the AAMA in conjunction with Papua New Guinea.

3.17 The meeting was informed that only one LHD had been reported for the airspace. The report was for a Category E report– 'Coordination errors in the ATC-to-ATC transfer of control responsibility'. This report was identified in the Australian incident data and related to a Brisbane ATC failing to provide the correct level coordination for an aircraft transferring to Port Moresby control. The risk was assessed inside the Port Moresby FIR as duration of two minutes.

3.18 **Table 4** below summarizes the results of the airspace safety oversight in terms of the technical, operational, and total risks for the RVSM implementation in the Papua New Guinea airspace.

PNG RVSM Airspace – estimated annual flying hours = 19170.66 hours *(note: estimated hours based on Dec 2007 traffic sample data)*			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
Technical Risk	0.0264×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	2.13×10^{-9}	-	-
Total Risk	**2.15 x 10-9**	5.0×10^{-9}	**Below Overall TLS**

Table 4: Risk Estimates for the RVSM Implementation in Papua New Guinea Airspace

3.19 Australia informed the meeting that even though the TLS had been met, the AAMA had serious doubts as to the validity of the risk estimate determined above due to the quality of the most recent (December 2009) TSD and concerns regarding the availability of LHD reporting within the Port Moresby FIR. This resulted in the AAMA relying on the December 2007 TSD. The AAMA would work with the ANSP to resolve these issues and is confident this can be achieved in the short-term.

3.20 The meeting thanked Australia and particularly the AAMA for its continuing efforts to assess the Papua New Guinea and hoped that the data quality issues could be resolved as a matter of urgency.

China RMA's Activities

3.21 China RMA briefed the meeting on the outcomes of the most recent safety estimate for the Chinese sovereign airspace and the Pyongyang FIR.

China Sovereign Airspace

3.22 The LHD reports were grouped by categories based on the details provided for each deviation. **Table 1** below summarizes the number of LHD occurrences by cause of the deviation.

LHD Category Code	LHD Category Description	No. of LHD Occurrences	LHD Duration (Min)	No. of flight levels transitioned without clearance
A	Flight crew failing to climb/descend the aircraft as cleared;	12	3.17	14
B	Flight crew climbing/descending without ATC clearance;	0	0	0
C	Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearances etc);	2	1.35	2
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);	2	2.67	1

E	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);	3	22	1
G	Aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure);	2	0	4
H	Airborne equipment failure leading to unintentional or undetected change of flight level (e.g. altimetry errors);	2	8.1	4
I	Turbulence or other weather related causes;	2	1.4	3
J	TCAS resolution advisory; flight crew correctly following the resolution advisory;	1	0	1
M	Other	1	0.833	0
Total		27	39.523	30

Table 1: Summary of LHD Causes in Sovereign Chinese Airspace

3.23 In light of the above, the LHD occurrences in the China RVSM airspace are summarized as follows:

- There were 27 reported LHD during the reporting period. Twenty-five (25/17.52min) of the deviations occurred within the domestic Chinese airspace, and two (2/22min) occurred in the oceanic airspace of the Sanya FIR. Five events contribute to technical risk. Twenty-two events contributed to the operational risk.

- Two events with longer duration occurred in the oceanic airspace of the Sanya FIR were related to coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility (Category E).

- The main contributor to the operational risk of Chinese RVSM airspace in this reporting period was flight crew failing to climb/descend the aircraft as cleared (Category A).

3.24 **Table 2** below provides the results of the airspace safety oversight, as of June 2010, in terms of the technical, operational, and total risks for the RVSM implementation in the sovereign Chinese RVSM airspace.

Chinese sovereign RVSM Airspace – estimated annual flying hours = 1 866 247 hours *(note: estimated hours based on the December 2009 traffic sample data. Estimate represents the sum of total flying hours for Radar and Procedural control area)*			
Source of Risk	**Lower Bound Risk Estimation**	**TLS**	**Remarks**
Technical Risk	1.741×10^{-10}	2.5×10^{-9}	Below Technical TLS
Operational Risk	1.853×10^{-9}	-	-
Total Risk	**2.027×10^{-9}**	**5.0×10^{-9}**	**Below Overall TLS**

Table 2: Risk Estimates for the RVSM Implementation in Sovereign Chinese RVSM Airspace

3.25 **Figure 1** below presents the trends of collision risk estimates for each month using the appropriate cumulative 12-month of LHD reports since July 2009.

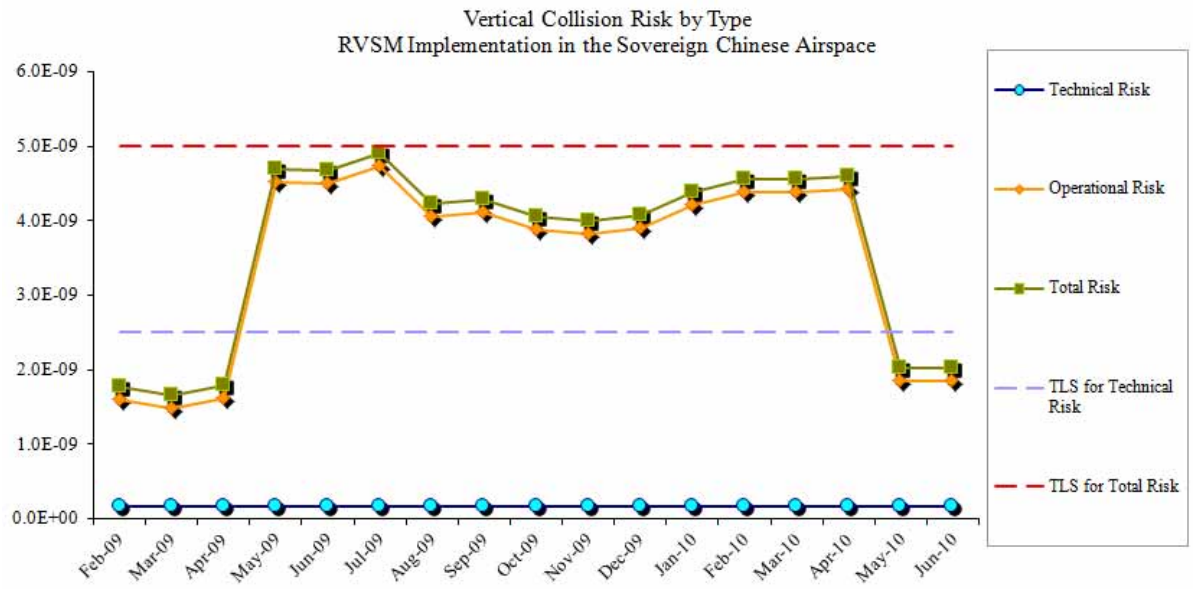

Figure 1: Trends of Risk Estimates for the RVSM Implementation in Sovereign Chinese Airspace

3.26 Based on these collision risk estimates, both the estimates of technical and total risks from the available TSD and LHD reports satisfy the agreed TLS value of no more than 2.5×10^{-9} and 5.0×10^{-9} fatal accidents per flight hour.

Pyongyang FIR

3.27 Monitoring of LHDs had been continuous in the Pyongyang FIR since 2009, with the criterion to identify a large height deviation set at 300 ft in magnitude. DPR Korea is aware of the concept of LHD, and continued to collect records of traffic movements and LHDs from the Pyongyang FIR. To date, there had been no report of an LHD for aircraft operating in the airspace of Pyongyang FIR.

3.28 To make a conservative estimate for the operational risk, China RMA applied the same operational risk value used in the preliminary assessment for Pyongyang FIR reported to RASMAG/11.

3.29 **Table 3** below provides the results of the airspace safety oversight, as of June 2010, in terms of the technical, operational, and total risks for the airspace of DPR Korea.

RVSM Airspace of DPR Korea – estimated annual flying hours = 6 044 hours *(note: estimated hours based on the December 2009 traffic sample data. Estimate represents the sum of total flying hours for Pyongyang FIR)*			
Source of Risk	**Lower Bound Risk Estimation**	**TLS**	**Remarks**
Technical Risk	0.402×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	1.55×10^{-9}	-	-
Total Risk	1.95×10^{-9}	**5.0×10^{-9}**	**Below Overall TLS**

Table 3: Risk Estimates for the RVSM Implementation in the Airspace of DPR Korea

3.30 **Figure 2** below presents the trends of collision risk estimates for each month using the estimated LHD data since July 2009.

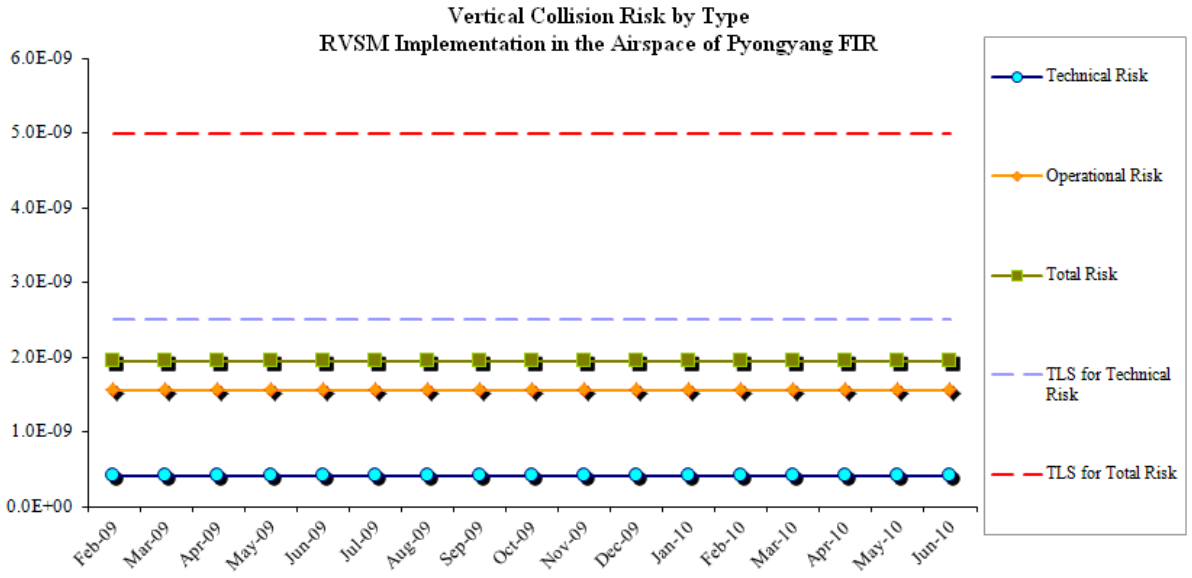

Figure 2: Trends of Risk Estimates for the RVSM Implementation in the Airspace of DPR Korea

3.31 Therefore, the estimates of both technical and total risks from the available TSD and LHD reports satisfy the agreed TLS value of no more than 2.5×10^{-9} and 5.0×10^{-9} fatal accidents per flight hour.

3.32 The meeting thanked China RMA for the excellent work they were performing and especially that they had been diligent in undertaking an assessment of the Pyongyang FIR. Australia also thanked China and noted that they had identified an increase in the number of Category A LHDs and enquired as to the nature of these incidents. China commented that they were all in radar surveillance where aircrew failed to capture an assigned level, passed through that level and was identified by ATC. The Secretary asked about Pyongyang FIR and how the assessment was made given there is no LHD reported. China stated they had discussed this at length with DPR Korea ATC authorities and they understood the requirement to report LHDs, however possibly as a result of the low flight hours in the FIR the opportunity for LHDs is also low. As a result, in the pre-implementation assessment, China RMA made a conservative estimate by using data from a similar FIR in China on which to base an operational risk assessment. In this report as there are still no LHDs reported, they used the pre-implementation report data to estimate the risk.

JCAB's RMA Activities

3.33 Japan Civil Aviation Bureau RMA (JCAB RMA) presented the meeting with the result of the most recent RVSM airspace safety assessment for the Fukuoka FIR, which was derived from the December 2009 TSD and LHD reports for the period May 2009 to April 2010.

3.34 **Table 1** below summarizes the number of LHD occurrences by the cause of the deviation and the duration of respective LHDs.

LHD Category Code	LHD Category Description	No. of LHD Occurrences	LHD Duration (Min)
B	Flight crew climbing/descending without ATC clearance	1	10
E	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters)	21	12.166
F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues	1	0
H	Airborne equipment failure leading to unintentional or undetected change of flight level (e.g. altimetry errors)	2	0.166
J	TCAS resolution advisory; flight crew correctly following the resolution advisory	9	3.76

Table 1: Summary of LHD Occurrences and Duration per Cause in the Japanese RVSM airspace

3.35 **Table 2** summarizes the number and duration of LHD occurrences classified according to the contributors to the technical risk or the contributors to the operational risk.

No. of LHD Occurrences / LHD Duration (min)		
Occurring within the Japanese airspace (34 / 26.1min)	Technical risk (11 / 3.9min)	TCAS resolution advisory (9 / 3.77min)
		Auto pilot trouble (2 / 0.17min)
	Operational risk (23 / 22.2min)	Coordination errors in the ATC- ATC transfer of control - human factors (21 / 12.2min)
		Coordination errors in the ATC -ATC transfer of control -equipment outage (1 / 0min)
		Flight crew climbing without ATC clearance (1 / 10min)

Table 2: Summary of LHD Occurrences Classified whether Technical Risk Contributors or Operational Risk Contributors.

3.36 Japan informed the meeting that nine LHDs contributed to the technical risk were the result of aircraft correctly following a TCAS Resolution Advisory and were considered to be non-risk bearing. The meeting noted that the main contributor to the 23 operational risks for Japanese airspace was coordination errors in the ATC-unit to ATC-unit transfer of control responsibility as a result of human factors issues. In addition to the 34 LHDs which occurred in the Japanese airspace, JCAB RMA received 12 LHDs which occurred outside of the Japanese airspace.

3.37 **Appendix C** to this report shows the geographical locations where LHDs that contributed to the operational risk occurred. Transfer errors tended to happen over the south-western boundary of the Fukuoka FIR.

3.38 **Table 3** summarizes the value and source material for estimating values for each of the inherent parameters of the internationally accepted Collision Risk Model (CRM) used to conduct the safety oversight for the RVSM airspace.

Parameter Symbol	Parameter Definition	Parameter Value	Source for Value
Vry	Average cross track speed of aircraft pairs	11.6 kt	Kushiro Air Route Surveillance Radar data (R220 route, NOPAC, Apr. 1994)
Vrz	Average vertical speed of aircraft pairs	1.5 kt	Value often used
λx	Average aircraft length	0.0288 nm	FDPS data (December 2009)
λy	Average aircraft width	0.0263 nm	
λz	Average aircraft height	0.0083 nm	
Vrx(same)	Average same direction along track speed	28.9 kt	Kushiro Air Route Surveillance Radar data (R220 route, NOPAC, Apr. 1994)
Vrx(opp)	Average opposite direction along track speed	960 kt	Value often used
Nx(same)	The passing frequency of aircraft pair assigned to the adjacent flight levels under the same direction traffic	3.25×10^{-2}	FDPS data (December 2009)
Nx(opp)	The passing frequency of aircraft pair assigned to the adjacent flight levels under the opposite direction traffic	1.462×10^{-1}	FDPS data (December 2009)
Pz(1000)	Probability that two aircraft nominally separated by the vertical separation minimum 1000 feet are in vertical overlap	1.7×10^{-8}	Value specified in ICAO Doc. 9574
Pz(0)	Probability of vertical overlap in operational risk estimation for the assigned vertical separation z=1000 ft	0.54	Value often used (shown in RVSM/TF-9-IP/2)
Py(0)	Probability that two aircraft on the same track are in lateral overlap	0.0745	Using the data of secondary surveillance radar obtained by the Hachinohe Air Route Surveillance radar (domestic RNAV route, 2001-2002)
$Naz^{technical}$ (cross)	The collision risk for crossing routes (technical dimension)	5.90×10^{-11} [accidents/flight hour]	FDPS data (December 2009) is utilized for the calculation of $E_z(\theta)$.
$Naz^{operational}$ (cross)	The collision risk for crossing routes (operational dimension)	7.23×10^{-10} [accidents/flight hour]	By eq. (12).
H	Total flight hours of aircraft flying on the route segments within airspace under consideration	957711.25 flight hours	12 times of December 2009
T(0)	LHD duration in hours	0.3694 flight hours	23 LHD reports received from May 2009 to Apr 2010

Table 3: Estimates of the Parameters in the CRM

3.39 **Table 4** presents the estimates of vertical collision risk for the Japanese airspace. The estimate of the overall vertical collision risk is 4.16 x 10^{-9} fatal accidents per flight hour, which satisfies the globally agreed TLS value of 5.0 x 10^{-9} fatal accidents per flight hour.

Source of Risk	Risk Estimation	TLS	Remarks
Technical Risk	0.31 x 10^{-9}	2.5 x 10^{-9}	Below Technical TLS
Operational Risk	3.85 x 10^{-9}		
Total Risk	**4.16 x 10^{-9}**	**5.0 x 10^{-9}**	**Meets Overall TLS**

Table 4: Risk Estimates for the RVSM Implementation in the Japanese airspace

3.40 **Figure 1** presents the trends of collision risk estimates by type (e.g. technical, operational, and total) for each month using the appropriate cumulative 12-month of LHD reports during reporting period.

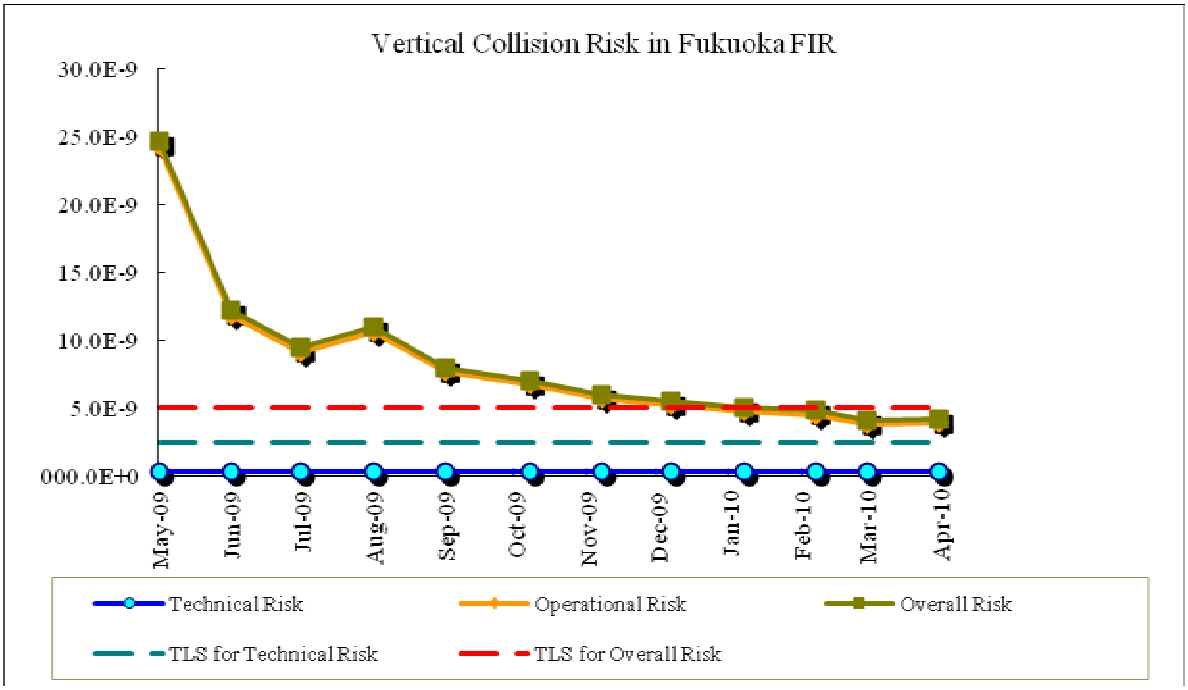

Figure 1: Trends of Risk Estimates for the RVSM Implementation in the Japanese Airspace

3.41 The meeting thanked Japan for their continued excellent work in providing RVSM risk assessments, noting that the assessed risk to the end of April 2010 meets the target level of safety.

MAAR's RMA Activities

Bay of Bengal Airspace

3.42 The Monitoring Agency for Asia Region (MAAR) provided a summary of airspace safety oversight for RVSM implementation in the Bay of Bengal (BOB) airspace. The RVSM safety oversight had been conducted based on a one-month traffic sample data (TSD) collected in December 2009 and monthly Large Height Deviation (LHD) reports between June 2009 and May 2010 submitted by States in the BOB region.

3.43 **Table 1** contains a summary of TSD received by MAAR.

BOB States	FIR Name	Status
Bangladesh	Dhaka	Incomplete
India	Chennai	Received
	Delhi	Received
	Kolkata	Received
	Mumbai	Received
Malaysia	Kuala Lumpur	Received
Maldives	Male	Received
Myanmar	Yangon	Received
Nepal	Katmandu	Received
Pakistan	Karachi	Received
	Lahore	Received
Sri Lanka	Colombo	Received
Thailand	Bangkok	Received

Table 1: Summary of December TSD Submitted by States in the BOB Region

3.44 A series of cumulative 12-month of LHD reports were used in this safety assessment starting from June 2009 to May 2010.

3.45 **Table 2** summarizes the number of LHD occurrences, associated LHD duration (in minutes), 12-month cumulative number of LHD occurrences, and 12-month cumulative LHD duration by month in the BOB RVSM airspace.

Month-Year	No. of LHD Occurrences	LHD Duration (Minutes)	12-month Cumulative Occurrences	12-month Cumulative Duration
June 2009	0	0	12	11
July 2009	0	0	11	10
August 2009	2	19	13	29
September 2009	1	1	13	30
October 2009	1	5	11	32
November 2009	0	0	10	32
December 2009	0	0	9	31
January 2010	2	0	10	30
February 2010	0	0	7	28
March 2010	1	3	7	28
April 2010	4	4	11	32
May 2010	0	0	11	32
Total	**11**	**32**	**11**	**32**

Table 2: Summary of LHD Occurrences and Duration in BOB RVSM Airspace

3.46 **Table 3** summarizes the number of LHD occurrences and associated LHD duration (in minutes) by cause of the deviation.

LHD Category Code	LHD Category Description	No. of LHD Occurrences	LHD Duration (Min)
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message)	2	6
E	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues (e.g. late or non existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters)	1	18
I	Turbulence or other weather related causes	1	3
M	Others	7	5
	Total	**11**	**32**

Table 3: Summary of LHD Causes in the BOB RVSM Airspace

3.47 In light of the above, the LHD occurrences in the BOB RVSM airspace are summarized as follows:

- Compared to the previous meeting, the number of LHD occurrences decreased from 13 to 11 occurrences while total LHD duration slightly increased from 30 to 32 minutes;

- Average duration of LHD occurrence is 2.9 minutes with maximum of 18 minutes;

- The overall LHD duration was driven by a significant event in August 2009, which accounted for 18 minutes or 60% of total duration; and

- Beside the event in August 2009, there are only a few non-nil LHD events reported from States in this region.

3.48 **Table 4** summarizes the results of the airspace safety oversight, as of **August 2010**, in terms of the technical, operational, and total risks for the RVSM implementation in the BOB airspace.

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.74×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	0.56×10^{-9}	-	-
Total Risk	**1.30×10^{-9}**	**5.0×10^{-9}**	**Below Overall TLS**

Table 4: Risk Estimates for the RVSM Implementation in BOB Airspace

3.49 In addition, **Figure 1** presents the trends of collision risk estimates for each month using the appropriate cumulative 12-month of LHD reports since June 2009.

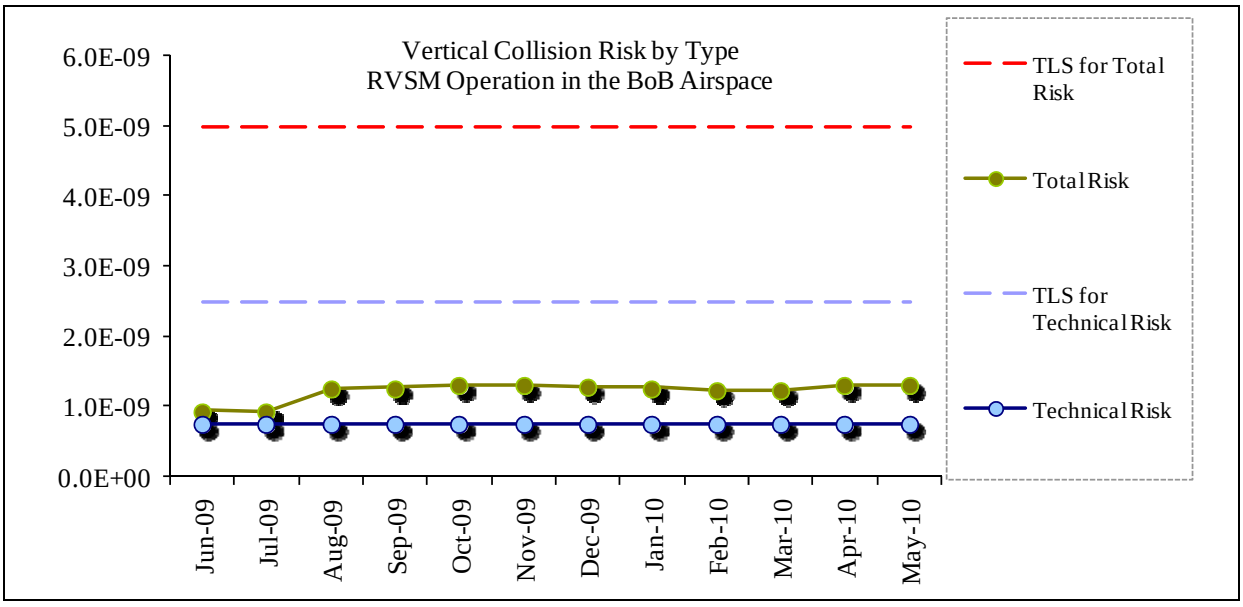

Figure 1: Trends of Risk Estimates for the RVSM Implementation in BOB Airspace

3.50 Based on these collision risk estimates, both technical and total risks from the **available TSD and LHD reports** satisfy the agreed TLS value of no more than 2.5×10^{-9} and 5.0×10^{-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.

3.51 It is important that relevant information be provided to MAAR in order to provide accurate and effective safety reports. It is strongly urged that States provide information to MAAR such that any adverse trends be identified in advance.

Western Pacific/South China Sea Airspace

3.52 MAAR also provided the summary of airspace safety oversight for RVSM implementation in the Western Pacific/South China Sea (WPAC/SCS) airspace. The RVSM safety oversight analysis had been conducted based on a one-month traffic sample data (TSD) collected in December 2009 and monthly Large Height Deviation (LHD) reports between **June 2009 and May 2010** submitted by concerning States in the WPAC/SCS region.

3.53 **Table 5** contains a summary of TSD received by MAAR for the RVSM safety oversight in the WPAC/SCS airspace.

States	FIR Name	Status
Cambodia	Phnom Penh	Received
China	Sanya	Received
Hong Kong	Hong Kong	Received
Lao PDR	Vientiane	Received
Malaysia	Kuala Lumpur	Received
	Kota Kinabalu	Received
Philippines	Manila	Received
Singapore	Singapore	Received
Thailand	Bangkok	Received
Vietnam	Hanoi	Received
	Ho Chi Minh	Received

Table 5: Summary of TSD Submission by WPAC/SCS States

3.54 Based on the received LHD reports submitted by WPAC/SCS States, the LHD occurrences between June 2009 and May 2010 in the WPAC/SCS region are summarized as follows.

3.55 **Table 6** summarizes the number of LHD occurrences and associated LHD duration (in minutes) by cause of the deviation.

LHD Category Code	LHD Category Description	No. of LHD Occurrences	LHD Duration (Min)
A	Flight crew failing to climb/descend the aircraft as cleared	1	10
B	Flight crew climbing/descending without ATC clearance	2	2
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message)	4	8
E	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues (e.g. late or non existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters)	57	68

F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues	1	1
I	Turbulence or other weather related causes	1	3
M	Other	8	6
Total		**74**	**98**

Table 6: Summary of LHD Causes in the WPAC/SCS RVSM Airspace

3.56 In light of the above, the LHD occurrences in the WPAC/SCS RVSM airspace were summarized as follows:

- Compared to the previous meeting, the total LHD duration improved from 110 minutes to 98 minutes while the number of LHD occurrences increased from 68 to 74 occurrences;
- Average duration of LHD occurrence improved from 1.62 minutes to 1.32 minutes; and
- Significant portion of LHD occurrences (57 of 74 occurrences) as well as duration (68 of 98 minutes) is contributable to coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues (Category E).

3.57 **Table 7** summarizes the results of the airspace safety oversight, as of **August 2010**, in terms of the technical, operational, and total risks for the RVSM operation in the WPAC/SCS airspace.

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.92×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	2.79×10^{-9}	-	-
Total Risk	**3.71×10^{-9}**	**5.0×10^{-9}**	**Below Overall TLS**

Table 7: Risk Estimates for the RVSM Implementation in WPAC/SCS Airspace

3.58 In addition, **Figure 2** presents the trends of collision risk estimates for each month using the appropriate cumulative 12-month of LHD reports.

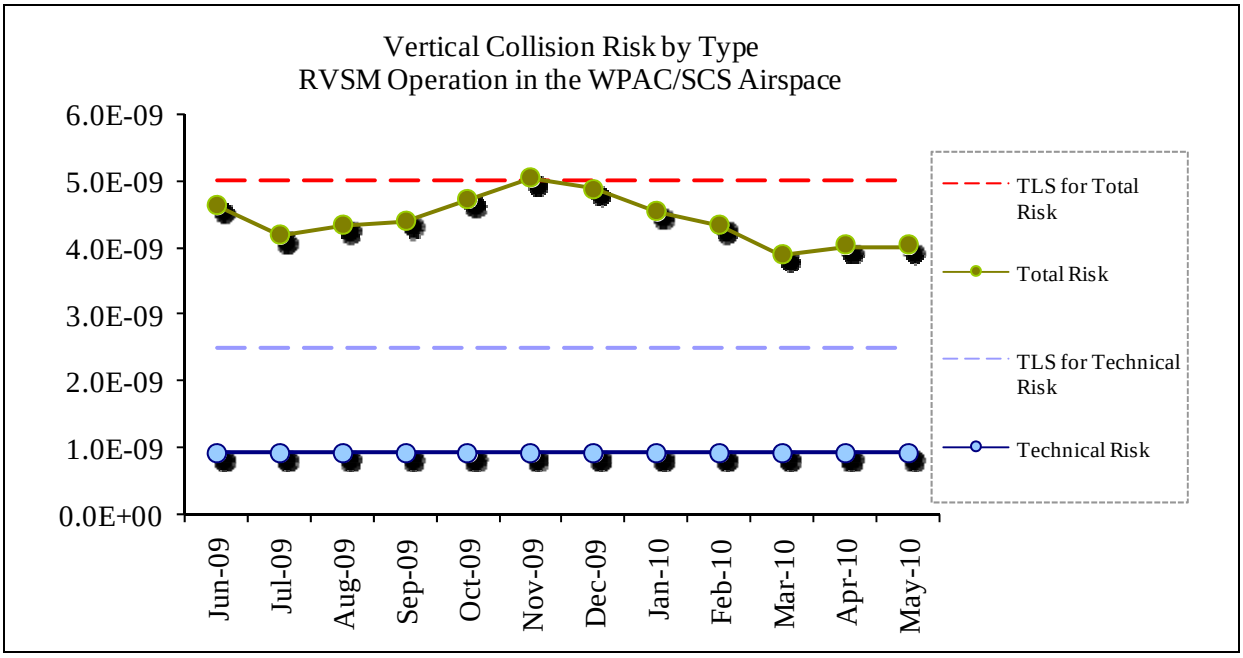

Figure 2: Trends of Risk Estimates for the RVSM Implementation in WPAC/SCS Airspace

3.59 Based on the collision risk estimate, both technical and total risks satisfy the agreed 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. The overall improvement is contributable to reduction in LHD occurrences and its duration.

3.60 Nonetheless, the number of LHD occurrences and duration is significant to the risk estimate. As a result, it is strongly recommended that States continue to take any remedial and preventive actions necessary to persistently maintain the number of LHD occurrence as well as duration to a minimum.

3.61 The meeting thanked MAAR for the good effort they provide to support safety in the region, noting the difficulties that they often face in getting the required data from States. The meeting also noted the fact that both the Bay of Bengal and WPAC/SCS airspaces remained below the TLS.

PARMO's RMA Activities

3.62 Pacific Approvals Registry and Monitoring Organization (PARMO) provided an update to the meeting including a summary of LHD reports, results of traffic data analysis and an estimate of vertical risk for the airspace under their responsibility. The report covered the reporting period 1 May 2009 to 30 April 2010. It contained a summary of large height deviation reports, and estimates of vertical risk for Pacific and North East Asia airspace.

3.63 PARMO, a service provided by the U.S. Federal Aviation Administration's Technical Center, serves as the RMA for the Pacific and for a portion of Northeast Asia airspace. PARMO produces two reports each calendar year following the standardized reporting period and format guidelines set forth by RASMAG. The report includes information relevant to continued safe use of the RVSM in a portion of North East Asia airspace as well as the Pacific airspace.

3.64 The report detailed the large height deviation reports received by the PARMO during the reporting period and the corresponding update to the vertical collision risk estimate. There were a total of 30 such reports submitted during the reporting period.

3.65 PARMO noted that when compiling their assessment, they had not received a December 2009 traffic movement sample for the Tahiti FIR. These traffic movement samples are used to update the vertical risk estimates contained in this safety monitoring report. However the meeting was informed that the Tahiti sample was provided prior to RASMAG/13.

3.66 The meeting noted that since April 2010, the PARMO had received LHD reports for each month from all of the FIRs. The PARMO continues to request that ATS providers forward reports of large height deviations (300-ft magnitude or more) on a monthly basis. A 'NIL report' (where applicable) is as valuable as a report containing actual incidents. Therefore, if zero large-height-deviation events occur during a calendar month, the PARMO requests that a 'NIL report' be submitted. The email address for the PARMO is: aparmo@faa.gov.

3.67 An overall reduction in the number of reported events for both the Pacific and Northeast Asia airspace was observed. The previous 12 month PARMO safety monitoring report included details of 33 events; the current report includes details of 30 events.

3.68 The LHD reports were separated by categories based on the details provided for each deviation. There were three such categories: large deviations contributing to technical risk, large height deviations contributing to operational risk and large height deviations occurring outside of RVSM airspace or airspace for which the PARMO is the responsible RMA. The two large height deviations reports in relation to technical risk involved aircraft correctly following an ACAS advisory and were considered to be non-risk bearing.

3.69 Out of 16 LHDs contributing to operational risk, 12 were reported for the Pacific airspace, and 4 of these events were reported for a portion of Northeast Asia airspace. Two of the events reported for the Pacific airspace had no effect on vertical risk and were not included in the current risk assessment.

3.70 Eleven of the 14 events that contribute to operational risk were related to air traffic control with seven events occurring in Pacific airspace, and the remaining four events in a portion of North East Asia airspace. It was noted that the cause of eight of the 11 events were related to errors in coordination of control between ATC facilities. All of these eight events were related to human factor issues. Four events related to coordination errors in Pacific airspace, and four events related to coordination errors in North East Asia airspace.

3.71 PARMO explained that the coordination errors occur either due to a lack of coordination or an error in the coordination from one ATC to the next. Although a decrease in the number of these reports has been realized, these errors continue to be the most common type of errors in both the Pacific and North East Asian airspaces.

3.72 In addition, Tables 1 and 2 present a summary of the reported errors by deviation code for the Pacific and Northeast Asia airspace, respectively.

LHD Category Code	LHD Category Description	No of LHD Occurrences	LHD Duration (Min)	No. of Flight Levels Transitioned Without Clearance
A	Flight crew failing to climb/descend the aircraft as cleared;	1	6	0
B	Flight crew climbing /descending without ATC clearance;	1	1	4
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);	1	5	1
E	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);	4	20	0
L	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC misinterpretation of flight plan);	1	10	0
M	Other	2	50	4

Table 1. Summary Large Height Deviations by Category – Pacific Airspace

LHD Category Code	LHD Category Description	No of LHD Occurrences	LHD Duration (Min)	No. of Flight Levels Transitioned Without Clearance
E	Coordination errors in the ATC-ATC transfer of control – human factors	4	2.1667	0

Table 2. Summary Large Height Deviations by Category – North East Asia Airspace

Estimate of Vertical Collision Risk for Pacific Airspace

3.73 Figure 1 provides the vertical collision risk estimates by type, e.g. technical, operational, and total, for each month during the current reporting period. Each monthly risk estimate was 'weighted' by the estimated number of flight hours in each Pacific airspace flow.

3.74 Figure 1 below provides the PARMO's updated risk estimates for the Pacific RVSM airspace based on recent reports of LHD. The estimated flying hours in the portion of the Pacific RVSM airspace for which the PARMO is the responsible RMA is 810,000 flying hours per year.

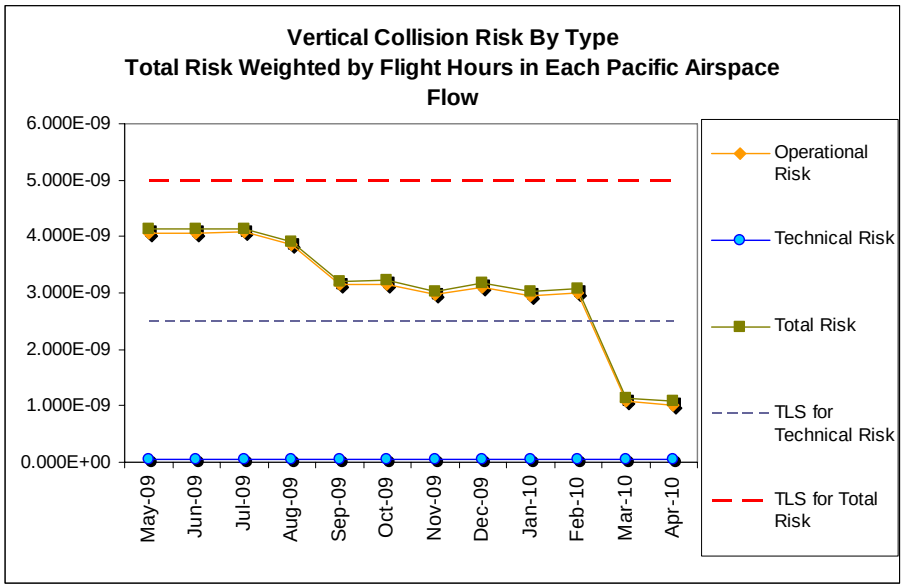

Figure 1. Vertical Collision Risk for Pacific RVSM Airspace

3.75 Table 3 below presents the estimates of vertical collision risk for the Pacific airspace. The technical risk is estimated to be 0.062 x 10^{-9} fatal accidents per flight hour. The operational risk estimate is 1.019 x 10^{-9} fatal accidents per flight hour. The estimate of the overall vertical collision risk is 1.080 x 10^{-9} fatal accidents per flight hour. This estimate meets the regionally agreed TLS value of 5.0 x 10^{-9} fatal accidents per flight hour.

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.062 x 10^{-9}	2.5 x 10^{-9}	Below Technical TLS
Operational Risk	1.019 x 10^{-9}	-	
Total Risk	1.080 x 10^{-9}	5.0 x 10^{-9}	Below Overall TLS

Table 3. Vertical Collision Risk Estimates for Pacific Airspace

Estimate of Vertical Collision Risk for North East Asia Airspace

3.76 The vertical collision risk was estimated in order to determine whether the TLS is met in a portion of Northeast Asia airspace. Table 4 presents the estimates of vertical collision risk for a portion of North East Asia airspace. The technical risk is estimated to be 1.786 x 10^{-9} fatal accidents per flight hour. The operational risk estimate is 2.284 x 10^{-9} fatal accidents per flight hour. The estimate of the overall vertical collision risk is 4.070 x 10^{-9} fatal accidents per flight hour. This estimate meets the regionally agreed TLS value of 5.0 x 10^{-9} fatal accidents per flight hour.

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	1.786 x 10^{-9}	2.5 x 10^{-9}	Below Technical TLS
Operational Risk	2.284 x 10^{-9}	-	
Total Risk	4.070 x 10^{-9}	5.0 x 10^{-9}	Below Overall TLS

Table 4. Vertical Collision Risk Estimates for North East Asia Airspace

3.77 Figure 2 provides the PARMO's updated risk estimates for a portion of North East Asia RVSM airspace based on recent reports of large height deviations.

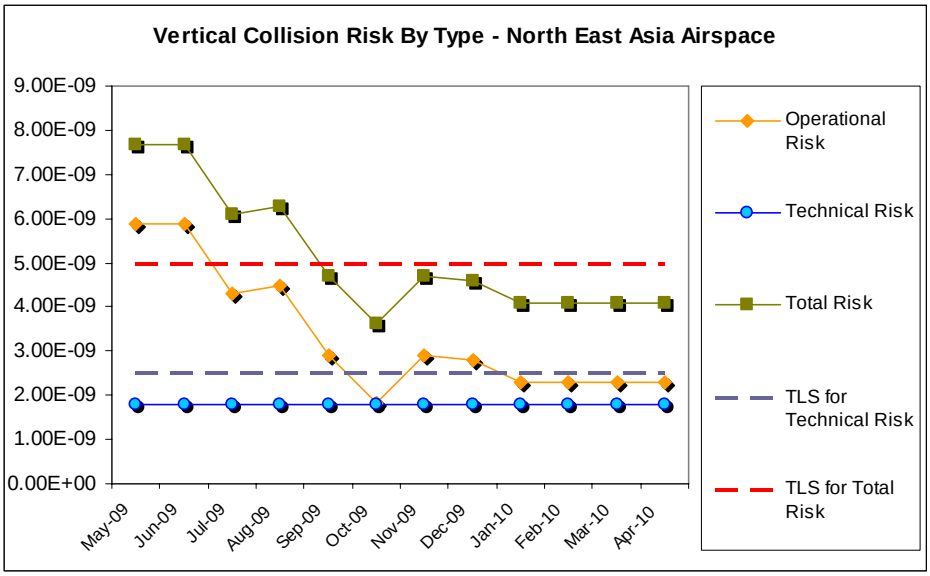

Figure 2. Vertical Collision Risk for North East Asia RVSM Airspace

3.78 The meeting noted with pleasure that the assessed risk for both the Pacific and Northeast Asia airspaces met the target level of safety and thanked the PARMO for its work as an RMA.

RVSM Implementation in the Ulaanbaatar FIR

3.79 MAAR reported that Mongolia planned to implement RVSM within the Ulaanbaatar FIR in November 2011. In January 2010, the State of Mongolia contacted MAAR and conveyed their intention to implement RVSM in the Ulaanbaatar FIR in November 2011.

3.80 The members of the Mongolia RVSM implementation team informed a meeting with MAAR of their intention to have MAAR as Mongolia's designated RMA, which is consistent with the ICAO RMA Manual. MAAR confirmed its full support and informed the members of the Mongolia RVSM implementation team of certain data requirements for assessing the safety of RVSM implementation. MAAR also recommended that Mongolia should officially inform the Regional Office regarding this matter.

3.81 The meeting noted the work being undertaken by Mongolia and MAAR to ensure the safe implementation of RVSM in the Ulaanbaatar FIR. United States asked which flight level allocation scheme would be used in the FIR. Mongolia stated that currently they used the Russian scheme but were reviewing that position to ensure the resolution of the flight level transition issues, and provided details on a series of meetings planned in the next few months that should resolve these issues.

Treatment of Flight Levels Crossed in the Assessment of Vertical Collision Risk

3.82 United States presented the calculation of operational vertical collision risk for aircraft transitioning through flight levels without clearance. The operational risk estimation process was the same for oceanic and domestic airspace. However, in oceanic airspace, the operational risk is dominated by the duration spent at incorrect flight levels. In domestic airspace where near real-time surveillance and communication exist; it is possible for ATC to detect the operational error before the aircraft maintains the incorrect flight level. In these cases, the aircraft may have crossed flight levels, triggered an ATC response and action, resulting in zero time at the incorrect flight level.

3.83 The paper provides examples of assumed aircraft climb/descent speeds developed and agreed to by the North American (NAM) Scrutiny Group (SG). The NAM SG examines all LHD occurrences and assigns duration, number of levels crossed, and speed to each event for inclusion in the estimate of vertical risk.

3.84 The United States provided the development of the mathematical model for estimating the number of collisions per level transitioned as:

$$C_t = P_y \frac{2\lambda_x \lambda_z}{\left|\bar{\dot{z}}\right| S_x} \left[E_z(same) \left(\frac{\left|\overline{\Delta V}\right|}{2\lambda_x} + \frac{\left|\bar{\dot{y}}\right|}{2\lambda_y} + \frac{\left|\bar{\dot{z}}\right|}{2\lambda_z} \right) + E_z(opp) \left(\frac{2\left|\bar{V}\right|}{2\lambda_x} + \frac{\left|\bar{\dot{y}}\right|}{2\lambda_y} + \frac{\left|\bar{\dot{z}}\right|}{2\lambda_z} \right) \right]$$

Where C_t is the number of collisions per level transitioned, $\left|\bar{\dot{z}}\right|$ is the assumed climb/descent speed for the flight level transition. It is assumed that the lateral path keeping is no worse than for aircraft in level flight, therefore $P_y(0)$ can be used for P_y. $E_z(same)$, $E_z(opp)$, $\left|\overline{\Delta V}\right|$, $\left|\bar{V}\right|$, $\left|\bar{\dot{y}}\right|$, λ_x, λ_y, λ_z, and S_x are the same values used in the vertical collision risk model for aircraft in level flight.

3.85 The resulting risk estimates are shown to be related to the exposure time during which an aircraft transitions through an unauthorized level (e.g. the assumed aircraft climb/descent speed). Higher speeds result in a lower risk because the aircraft passes more rapidly through potentially occupied flight levels faster than slower speeds.

3.86 The estimate of the collisions per level transitioned, C_t, is converted to fatal accidents per flight hour by:

$$N_{az} = 2K \frac{C_t}{T}$$

Where T = Annual flying hours in the airspace and K = the number of levels crossed. This estimate should be added to the operational risk estimate for aircraft in level flight to obtain the total operational risk estimate due to loss of vertical separation.

3.87 The meeting thanked the United States for this paper with the Chairman noting that while it had been presented previously as an information paper, the content was of such use to RMAs and Scrutiny Groups that it has been beneficial for it to be tabled as a working paper at this meeting. He questioned whether it might be feasible to have this material appended to the RMA Manual in some form and the meeting encouraged the United States to pursue that option. The United States also informed the meeting that it is important to recognize that the performance values identified in Appendix A were derived from airline transport pilots and other expert opinion.

Observed Effect of the Implementation of AIDC between Japan and Republic of Korea (ROK) on the Occurrence of Category E/F LHDs

3.88 The United States recalled that Japan Civil Aviation Bureau RMA (JCAB RMA) presented to RASMAG/12 a report on the occurrence of Large Height Deviations (LHDs) caused by ATC-to-ATC errors between Japan and ROK before and after the implementation of AIDC. JCAB RMA has reported that the total vertical risk estimate for Japanese airspace (i.e. the airspace of Fukuoka FIR) has not satisfied the agreed Target Level of Safety (TLS) value since 2007 due to the high number of category E LHDs (coordination error in ATC-to-ATC transfer of control responsibility as a result of human factor issues).

3.89 AIDC has been implemented among the ACCs of the two States, i.e. three ACCs of Japan and the ACC of ROK, since 15 June 2009. PARMO conducted this analysis highlighting the occurrence of LHDs caused by ATC-to-ATC transfer errors due to human factors and technical issues between Japan and ROK before and after the implementation of AIDC. The paper noted that a total of 26 LHD events were reported from 1 August 2008 to 31 May 2010.

3.90 Table 1 details the 10 LHD reports that occurred after the implementation of AIDC.

Event Date	Source	Location of Deviation	Duration of LHD (min) in Incheon FIR	Code
21-Jul-09	Naha ACC	ATOTI (B576)	0	E
19-Aug-09	Incheon ACC	SADLI (A593)	0.08	E
23-Aug-09	Incheon ACC	ATOTI (B576)	0.08	E
21-Sep-09	Naha ACC	ATOTI (B576)	0	E
1-Oct-09	Naha ACC	ATOTI (B576)	0	E
15-Nov-09	Naha ACC	ATOTI (B576)	Unknown	E
7-Dec-09	Naha ACC	ATOTI (B576)	0	E
21-Jan-10	Naha ACC	ATOTI (B576)	0	E
26-Jan-10	Naha ACC	ATOTI (B576)	0	E
11-May-10	Fukuoka ACC	ATOTI (B576)	Unknown	E

Table 1: LHDs reported after the implementation of AIDC between Japan and ROK

3.91 Comparing the 22 month reports of LHDs before and after the implementation of AIDC, the meeting found that 16 Category E/F LHDs occurred between 1 August 2008 and 15 June 2009, whereas 10 LHDs occurred between 16 June 2009 and 30 May 2010. The meeting noted these outcomes that appear to vindicate the use of AIDC as a means of reducing error in communication.

Assignment of State Non-Approved Operators Using Pacific RVSM Airspace

3.92 United States provided an assessment of operators who identified themselves as having State RVSM approval but for whom a record of RVSM approval was not found during the data collection period of December 2009.

Traffic Sample Data

3.93 PARMO requests an annual one month traffic movement sample in addition to all of the LHD reports from the ATS providers in the Pacific and Northeast Asia airspace. The traffic sample data (TSD) for December 2009 for the Pacific and Northeast Asia airspace was received from all except one of the FIR's under PARMO responsibility.

Assessment of Non-State-Approved Operators Using the Pacific and Northeast Asia Airspace

3.94 United States provided a summary of operator compliance with State approval requirements in the Pacific and Northeast airspace where the RVSM is applied. This assessment was carried out using the one-month samples of Pacific and North East Asia traffic movement data collected during December 2009. The importance of timely notification by States of operator approval status to RMAs is emphasized by the results presented in the paper.

3.95 All civil aircraft operations observed in each sample were compared against the collective approvals database from January 2010. The operator-aircraft combinations identified as asserting approval for operations in RVSM airspace ("/W" or "/Q" in Field 10 of the ICAO flight plan) found in the traffic data, were cross-examined with the collective approvals database. The operator-aircraft combinations identified were still under investigation.

3.96 Experience had shown that the primary systematic reason for failure to match operations and approvals was a delay in State notification of the approval status of some operators to the appropriate RMA. This situation should be remedied in the future because of the widespread application of RVSM throughout the Region.

3.97 The meeting noted the results of the airspace safety oversight presented by the United States and encouraged other RMAs to continue similar work and to share results of their analyses.

Identification of Non-Approved Airframes Operating with RVSM Approved Status

3.98 Australia presented WP/17 in which it highlighted the fact that the issue of aircraft operators not notifying their true RVSM approval status in flight plan information has been a recognised problem by Asia/Pacific Regional Monitoring Agencies (RMAs) for some time. As a result, RASMAG has previously briefed APANPIRG on this issue and at RASMAG/12, both the AAMA and China RMA provided further evidence that the issue is of significance to the region. That meeting had agreed that all RMAs should continue this work and report results to RASMAG/13 so that further advice regarding this issue can be provided to APANPIRG/21.

3.99 The meeting was informed that prior to July 2010, the AAMA had only been utilising a process that identified so called 'rogue' operators within the Australian FIRs based on a comparison with the Australian RVSM approvals database. The AAMA has now extended that process to include a comparison of all RVSM approval databases from the global RMAs posted to the KSN website against the total flight plan data set available to Airservices Australia. Figure 1 below details the results of the comparison by number of identified airframes related to State of registry.

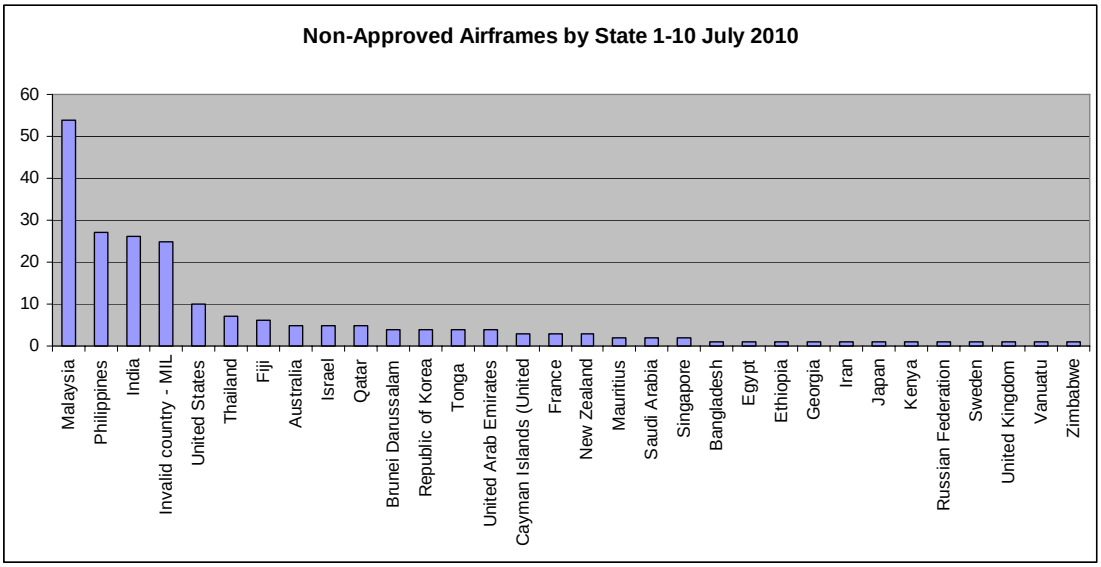

Figure 1. Non-approved Airframes by State of Registry

3.100 Australia stated that in total, the comparison undertaken by the AAMA identified 213 airframes over a ten day period in July 2010, with airframes from Malaysia showing the highest number of 54. The next highest three States were the Philippines, India and the United States. The paper provided details of the state of registry, aircraft registration and type.

3.101 The meeting noted the concerns expressed by the AAMA in relation to the quality of the data contained in the approvals databases provided by other RMAs primarily as a result of non-standard formatting. Australia commented that given that there is now an agreed format for collection of this type of data, and that it is likely that more RMAs will undertake broad based comparative checks of aircraft operating in their assigned airspaces, it is imperative that the database formatting and data quality is maintained to a high standard. The AAMA sought the assistance of the global RMAs in achieving this outcome and for the Asia/Pac RMAs to review and adjust their approval databases at their earliest convenience but at least by end of December 2010.

3.102 The meeting thanked Australia for the paper and agreed that RMAs should review their approvals databases before the end of the year. Additionally the meeting agreed that RMAs should continue to validate and share approvals data so that the identification of non-approved airframes can continue. The United States commented that it should be remembered that ensuring the data is correct is primarily the role of the State regulatory authority however the RMAs should continue to identify non-approved airframes and provide that information to the States concerned for action.

Monitoring of RVSM Non-Approved Aircraft Operating in the RVSM Airspace of Asia Region

3.103 Thailand provided a summary of operators/aircraft type operating within the RVSM airspace which is monitored by MAAR with no record of RVSM approval in the RMAs' RVSM Approvals Database.

Data Source Used in the Monitoring of RVSM Non-Approved Aircraft Operators in the Asia Region

3.104 According to APANPIRG Conclusion 20/22, States in the region were requested to provide an annual update of RVSM approvals to RMAs.

Methodology of Assessment and Findings of RVSM Non-Approved Aircraft Operating in the RVSM Airspace of the Asia Region

3.105 MAAR conducted the monitoring of operator compliance with State approval requirements based on the comparison between operator code and aircraft type from the submitted TSD combined with the RVSM approval database from RMAs. MAAR provided the details of operators/aircraft types, operating in the RVSM airspace with no record of RVSM approval in the RMAs' RVSM Approvals Database based on available data.

3.106 The meeting noted that, as a follow-on action, the MAAR had submitted enquiries to both States and aircraft operators to update the RVSM approval status based on initial assessment. However, only a few responses were attained.

3.107 Thus, to overcome these difficulties, the MAAR recommended that the following remedial actions be taken:

- States provide approvals records to respective RMA;
- Annual update of RVSM approvals be provided to MAAR; and
- Aircraft registration field be provided as part of TSD.

Assessment of State Non-Approved Operators Using Domestic Chinese RVSM Airspace

3.108 China RMA submitted to the fifth RMA Coordination Meeting (RMA CG/5, May 2010), the assessment of RVSM non-approved aircraft operating in Chinese RVSM airspace during the period of December 2009. Fifty-two operations were identified in the traffic sample for which the RVSM approvals database indicated the aircraft is RVSM non-approved but flight plan data indicated that the aircraft had 'W' in field ten. Forty-two operations were identified for which the RVSM approvals database indicated the RVSM approval for these aircraft expired but the flight plan data indicated that the aircraft had 'W' in field ten. The purpose that China RMA noted about this to the RMACG/5 meeting is that there is a delay in notification of the approval status of some operators and other RMAs may experience similar problems with States reporting approvals. It should also be mentioned that most of the flights were conducted by aircraft from the Russian Federation. The meeting was informed that the EUR RMA is currently collaborating with Russia in support of RVSM implementation in Nov 17, 2011 in the EURASIA Region and they will provide assistance in resolving the issue of reporting approvals.

3.109 China RMA commented that there was an obvious decrease in the number of identified State non-approved operations in the domestic Chinese RVSM airspace compared to the result reported to RASMAG/12. The reason was that the China RMA only compared the global RVSM approval dataset with the column of ICAO Flight Plan Field 10 information contained in the Traffic Sample Data. So for this report, China RMA also used the December 2009 flight plans data to cross check the 'ICAO Flight Plan Field 10' column in the Traffic Sample Data. This check improved the correctness of ICAO Flight Plan Field 10 information and registration number in the Traffic Sample Data. Another reason is that the RVSM approval information from the Middle East RMA has been updated. In the last analysis, the majority of 'non-approved' operations in the domestic Chinese airspace were conducted by the aircraft from the Middle East regions where an up-to-date approval

exchange was not available. This situation has improved this year and all the RVSM approval statuses for the aircraft from the Middle East regions are identified.

3.110 ATM/AIS/SAR/SG/12 was informed that the high number of RVSM non-approved aircraft operating in Chinese airspace was partly because China requires an additional RVSM approval from CAAC in addition to the original RVSM approval from their State of Registry/Operators. The approval data for foreign aircraft that China RMA applied to complete the analysis is from the monthly exchanged approval dataset with other RMAs. The China RMA has confirmed with Flight Standard Department of CAAC that all the foreign air transportation carriers should comply with Chinese Civil Aviation Regulations Part 129 (CCAR-129) to obtain operation certification in China and there is no additional RVSM approval in addition to the original RVSM approval from their State of Registry/Operators. For the operation certification for foreign air transportation carriers in China, the current and valid certificate of RVSM airworthiness and registration issued by the State of Registry is accepted by CAAC. It should be noted that some Russian aircraft with metric altimeter shall comply with special requirement to be capable of operating in Chinese RVSM airspace, but the airworthiness and operational approval for these aircraft are issued by the CAA of Russian Federation.

Report from South East Asia Safety Monitoring Agency: May 2009 – April 2010

3.111 South East Asia Safety Monitoring Agency (SEASMA) provided a report on operations on the six major ATS routes in the South China Sea airspace in order to determine compliance with Asia and Pacific Regions safety goals for the established lateral and longitudinal separation standards. The report covered the period 1 May 2009 through 30 April 2010.

Results of Data Collection

3.112 The fidelity of large-error and traffic-count reporting by each responsible air navigation service provider (ANSP) for the period May 2009 through April 2010 is shown in table 1.

Reported Traffic Counts for May 2009 through April 2010 Monitoring Period

3.113 Table 1 presents the total traffic counts reported by month transiting all South China Sea monitoring fixes for the period May 2009 through April 2010.

Monitoring Month	Total Monthly Traffic Count Reported Over Monitored Fixes	Cumulative 12-Month Count of Traffic Reported Over Monitored Fixes Through Monitoring Month
May 2009	6962	86146
June 2009	6856	85259
July 2009	6789	83625
August 2009	6849	82906
September 2009	6145	81758
October 2009	6567	80652
November 2009	6419	80495
December 2009	6585	80415
January 2010	7230	80401
February 2010	6855	80876
March 2010	7527	81387
April 2010	7045	81829

Table 1: Monthly Count of Monitored Flights Operating on South China Sea RNAV Routes for the period May 2009 through April 2010

Reports of Large Lateral Deviations (LLDs) and Large Longitudinal Errors (LLEs) for the Monitoring Period May 2009 through April 2010

3.114 Table 2 presents the cause of deviation in the LLD report received in the month of April.

Deviation Code	Cause of Deviation	No of Occurrences
E	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility;	1

Table 2: Cause of deviation in the LLD report

Risk Assessment and Safety Oversight

Estimate of the CRM Parameters

3.115 The lateral separation standard between RNAV routes L642 and M771 is 50 NM and 60 NM otherwise for the RNAV routes.

3.116 The longitudinal separation standard for co-altitude aircraft on RNAV routes L642 and M771 is 50 NM; the longitudinal separation standard is either 10 minutes with Mach Number Technique (MNT) or 80 NM RNAV otherwise for the RNAV routes.

Safety Oversight

3.117 Table 3 summarizes the results of the airspace oversight, as of April 2010.

Type of Risk	Risk Estimation	TLS	Remarks
Lateral Risk	0.044×10^{-9}	5×10^{-9}	Below TLS
Longitudinal Risk	1×10^{-9}	5×10^{-9}	Below TLS

Table 3: Lateral and Longitudinal Risk Estimation

3.118 Figure 1 presents the results of the collision risk estimates for each month using the cumulative 12-month LLD and LLE reports since May 2009.

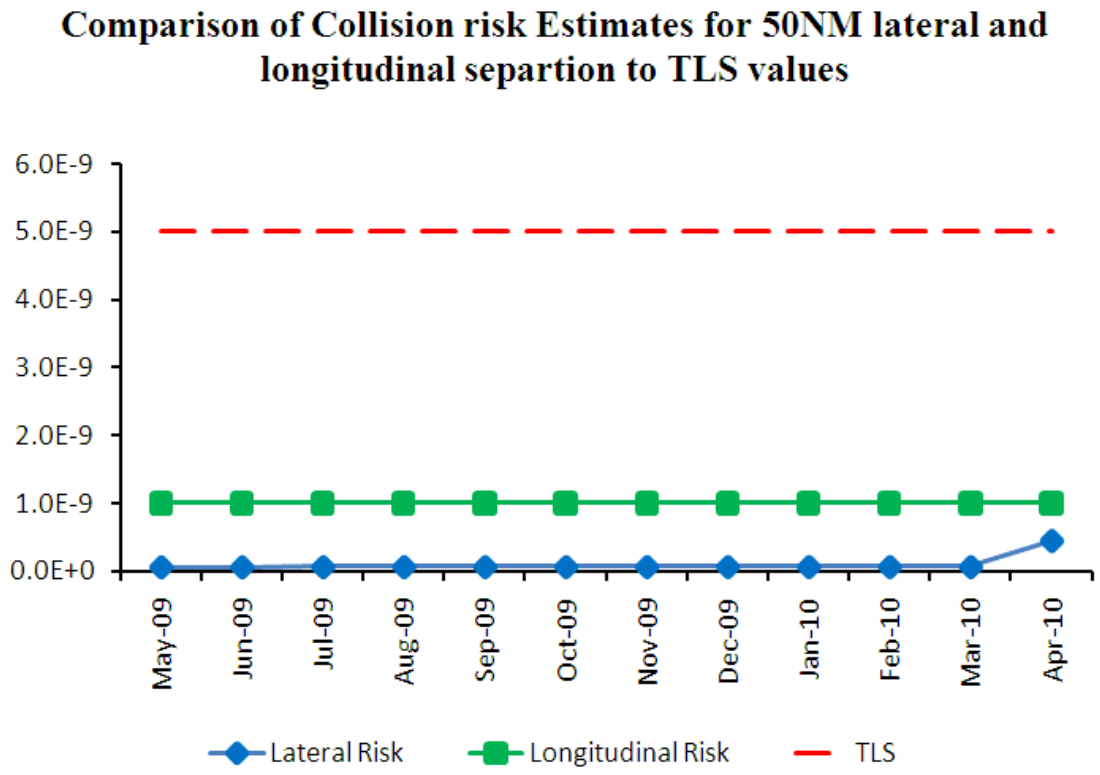

Figure 1 - Assessment of Compliance with Lateral and Longitudinal TLS Values Based on Navigational Performance Observed During South China Monitoring Program

3.119 As can be seen, both the estimates of lateral and longitudinal risk show compliance with the corresponding respective TLS values during all months of the monitoring period.

3.120 The meeting thanked Singapore for providing the comprehensive report. Japan questioned in relation to the apparent difference between seemingly similar type reports (ATC-ATC facility coordination) for the vertical dimension and the lateral/longitudinal dimensions, particularly, why there were so few reports from latitude/longitudinal dimension. The meeting could not find the reasons known for certain; opinions were advanced regarding the primary use of controllers for vertical separation and the dynamic nature of vertical request/change versus far fewer route re-clearances. Also, the EMA report is pertinent to much smaller airspace volume which would reduce reports as well.

Agenda Item 4: Airspace Safety Monitoring Documentation and Regional Guidance Material

Global Operational Data Link Document (GOLD)

4.1 The meeting was informed that the GOLD was intended primarily for those who are involved in planning and implementation of data link services and day-to-day operations, and would harmonize oceanic and continental (domestic) data link operations worldwide.

4.2 The GOLD has effectively replaced the *Guidance Material for ATS Data Link Services in North Atlantic Airspace* (NAT Data Link GM) and the *FANS-1/A Operations Manual* (FOM) for Asia/Pacific (APAC), South American (SAM) and African/Indian Ocean (AFI) Regions. The GOLD also includes provisions for the aeronautical telecommunication network (ATN) implementation in the European Region.

4.3 APANPIRG/20 concluded that, upon release of the GOLD by the Ad-Hoc GOLD Working Group in 2010, the FOM be withdrawn and replaced by the GOLD as Asia/Pacific regional guidance material. The GOLD Ad-Hoc Working Group completed the first edition, which was published on 14 June 2010. The Regional Office issued a State letter Ref. T 3/10.0 – AP108/10 (ATM) on 28 June 2010 to notify States and international organizations of the publication.

4.4 The First Edition of GOLD is available for download on the following public websites:

FAA:
http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/oceanic/data_link/;

Airways New Zealand:
http://www.ispacg-cra.com; and

ICAO Asia and Pacific Office:
http://www.bangkok.icao.int/edocs/index.html.

4.5 This document is maintained as a regional document in coordination with all ICAO planning and implementation regional groups (PIRGs) providing data link services within their region. Each participating PIRG establishes a mechanism for submitting and administering change proposals.

4.6 It was noted that Change proposals (CPs) could be submitted by any stakeholder participating in data link operations. The stakeholder should submit a CP to any ICAO regional office concerned. The ICAO regional office would coordinate the CP within its own region, and with other regions and ICAO Headquarters to determine the acceptability of the CP. Regions concerned would need to accept the CP before the GOLD could be amended by any region. Once the ICAO regional office has completed coordination and the PIRGs concerned accept the change proposal, the change would be concluded by each of the PIRGs.

4.7 A global configuration management process will need to be put in place by ICAO whereby the document would be maintained in coordination between the concerned PIRGs and the ICAO Secretariat. In the initial period, the GOLD Ad-Hoc Working Group will assist the Secretariat in the global coordination of future amendments to the GOLD.

4.8 The members were encouraged to read the document in detail and to provide comments through their state representatives at relevant meetings.

Proposed Changes to the Asia/Pacific Regional En-Route Monitoring Agency (EMA) Handbook

4.9 Singapore informed the meeting that one of the duties of an EMA as stated in the *EMA Handbook* is to receive reports of large horizontal-plane deviations identified during monitoring. This will include any large lateral deviation (LLD) and/or large longitudinal error (LLE). States are recommended to use the suggested form in the EMA handbook (APPENDIX E) when submitting such reports.

4.10 In Appendix E of the EMA Handbook, it was stated that deviations due to weather and other contingency events will need to be reported. However, if ATC approval for deviation had been granted, such deviation should not constitute a large horizontal-plane deviation. The proposed changes in **Appendix D** to this report clarified that large horizontal-plane deviation identified in the monitoring process would not include ATC-approved deviations or other contingency events unless the deviation magnitude is greater than the approved deviation.

4.11 The meeting noted that large horizontal-plane deviation did not include ATC approved deviations or other contingency events, and adopted the proposed changes to the EMA Handbook.

Agenda Item 5: Airspace Safety Monitoring Activities/Requirements in the Asia/Pacific Region

RASMAG List of Competent Airspace Safety Monitoring Organizations

5.1 RASMAG is required by its Terms of Reference to recommend and facilitate the implementation of airspace safety monitoring and performance assessment services, and to review and recommend on the competency and compatibility of monitoring organizations. Accordingly, the meeting reviewed and updated the *"RASMAG List of Competent Airspace Safety Monitoring Organizations"* (shown at **Appendix E** to this report) for use by States requiring airspace safety monitoring services.

Establishment of PBN Approval Database

5.2 Japan recalled that at RASMAG/12, New Zealand proposed combining and linking the RVSM and the PBN databases. JCAB RMA had been inspired by the proposal, and combined the PBN database with the RVSM database.

5.3 The RVSM/PBN combined database established by JCAB RMA consists of the information of 753 aircraft in total as of 2 July 2010. It includes 688 RVSM approved aircraft, 386 RNP 10 approved aircraft, 716 RNAV 5 approved aircraft, 708 RNAV 1 & 2 approved aircraft, 16 RNP-approach approved aircraft, and 1 RNP 4 approved aircraft. There are 65 aircraft which have PBN operational approvals but no RVSM operational approval, and they are the aircraft such as DH8D, SB20, B350, AS65 and D228.

5.4 JCAB RMA has also combined the RMA F2/F3 forms and EMA A2/A3 forms as shown in **Appendix F** to this report. The format of the RVSM/PBN combined database established by JCAB RMA as shown in **Appendix G** to this report had been prepared for use on an as-needed basis. The format is less comprehensive than the format proposed by New Zealand at RASMAG/12. This is because of the current mixed environment of data sharing. As an RMA, RVSM-related data

shall be exchanged with the other RMAs, whereas PBN-related data have not been exchanged among EMAs yet. The database established by JCAB RMA is the combination of the globally shared RVSM data and the locally required PBN data. JCAB RMA foresees lasting improvement of the database format according to the development of PBN operations.

5.5 The meeting congratulated Japan on their initiative with developing the means to capture PBN approvals information. Singapore also thanked Japan and both agreed to share PBN data that they had captured. The Chairman suggested that possibly other RMAs could review their F2/F3 forms to capture this information and this was supported by the meeting. The United States noted that currently to be able to provide a PBN registry linking approvals to a specific aircraft would be difficult for them. However they commented that the sharing of PBN data between EMAs is a good outcome which should be strived for.

Analysis to Determine the Potential of the First Height Monitoring Unit (HMU) in Japan

5.6 Japan had indicated its intention to deploy three HMUs in Japan, with the first one (Okayama HMU: HMU-1) targeted to become operational in the third quarter of 2011. Japan provided an analysis undertaken by JCAB RMA to determine the future potential of HMU-1 as the first ground-based height-keeping performance monitoring system in Japan. The estimation was derived from the one week traffic sample data of 23-29 May 2010.

5.7 There are several ATS routes going through the coverage of HMU-1. The following analysis was conducted by counting the actual flight plans which filed these ATS routes and one of the RVSM altitudes between 23 and 29 May 2010 to estimate the operators, types of aircraft and the number of aircraft which will be measurable by HMU-1.

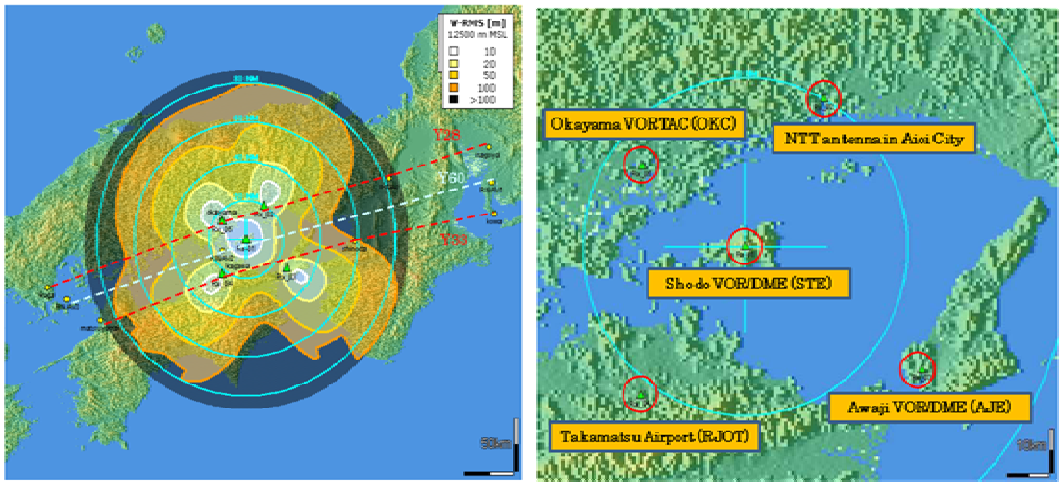

Figure 1: Site of Height Monitoring Elements (HMEs) of HMU-1 and its Coverage

5.8 In total, 2 298 aircraft were estimated as measurable in a week. 1 805 (78.5 %) were the aircraft of Japanese airlines, and 487 (21.2%) were the aircraft of non-Japanese airlines. The estimations were rough calculation by using flight plan data and the HMU's Dilution of Precision (DOP) chart. More accurate estimations would be available only after the flight validation of HMU-1, which is planned early next year. In addition, the height-keeping performance monitoring is vulnerable to meteorological conditions.

5.9 The meeting thanked Japan for the information and noted the significant progress made in establishing height monitoring capability. The United States commented that it was obvious that the unit has identified a number of US based aircraft and therefore they proposed to work with Japan to share ASEs information so that comparisons can be made. Japan appreciated the offer and would seek to undertake this work.

PARMO Assessment of the Monitoring Responsibility Associated with the Long-Term Height Monitoring Requirements

5.10 Subsequent SASP deliberations and actions by the ICAO Air Navigation Commission (ANC) have resulted in the addition of long-term RVSM monitoring requirements to Annex 6 - Operations of Aircraft, with the effective date of the requirements planned for 2010. The following text was adopted by the ANC for Annex 6, Parts I and II, Chapter 7:

> *7.2.7 The State of the Operator that has issued an RVSM approval to an operator shall establish a requirement which ensures that two aeroplanes of each aircraft type grouping of the operator have their height keeping performance monitored, at least once every two years or within intervals of 1 000 flight hours per aeroplane, whichever period is longer. If an operator aircraft type grouping consists of a single aeroplane, monitoring of that aeroplane shall be accomplished within the specified period.*

5.11 RASMAG/8 concluded that RMAs should carry out tasks related to the forthcoming long-term monitoring requirements. At RASMAG/10, PARMO reported the approach planned to address the LTHM actions. The plan included the use of the December 2008 TSD to establish the monitoring requirements for each operator in the airspace for which the PARMO is responsible and determine the number of airframes which need monitoring within the first two year period, e.g. 2010 – 2012. PARMO is not responsible for supporting monitoring of all operator/aircraft-type combinations in the TSD, just those domiciled in States for which the PARMO is responsible. At RASMAG/11, an LTHM impact statement was prepared for the combined Asia/Pacific region to be presented to APANPIRG/20 for adoption and circulation as regional guidance material.

5.12 At RMA CG/5, a new MMR table proposed by the European RMA was adopted by the attending RMAs. The changes incorporate new aircraft types, modifications to two existing groups and an update to aircraft series.

5.13 United States provided an update to the assessment of LTHM requirements for States under PARMO monitoring responsibility with the December 2009 TSD and the updated MMR table, as shown in Appendix XX to this report, and correlated the resultant burden to the monitoring infrastructure proposed at RASMAG/12. The intent was that the revised assessment be incorporated with the revised assessments conducted by the other Asia/Pacific Region RMAs.

5.14 The December 2009 TSD collected by PARMO was examined to determine the operators conducting operations within the FIRs for which PARMO is responsible, i.e. Anchorage, Auckland, Incheon, Nadi and Oakland. All unique operator/aircraft combinations were identified and mapped to a monitoring category in the Minimum Monitoring Requirements (MMR) chart. **Appendix H** to this report contains the complete listing of the civil operations observed in the December 2009 TSD obtained from airspace for which the PARMO is the responsible RMA. In addition to those operations for which the PARMO is the responsible RMA, the operations for which the North America Approvals Registry and Monitoring Organization (NAARMO) is the responsible RMA are also of interest to the PARMO.

5.15 The meeting thanked the United States for the updated information and asked the Secretary to ensure that the Long Term Height Monitoring Impact Statement was updated with this information.

Updated Estimate of RVSM Long-Term Height Monitoring Burden for the Australian Airspace Monitoring Agency (AAMA)

5.16 Australia noted that the Long-Term Height Monitoring Impact Statement developed by RASMAG was endorsed by APANPIRG/20 in September 2009. That statement included a determination by each of the Asia/Pacific Regional Monitoring Agencies (RMAs) of the anticipated monitoring burden for each State within the region. RASMAG/12 tasked the RMAs to review and update that data.

5.17 The meeting was informed that a review of the most recent RVSM approvals databases determined that the monitoring burden continues to increase, specifically in the case of Australian and Indonesian operators. The former has seen an increase of 37 in the total number of airframes required to be monitored to a total of 143. The latter increased by 5 to a total of 61. Overall the revised monitoring burden for the AAMA is expected to be approximately 207 airframes over the two year period commencing November 2010. The meeting thanked Australia for the updated data and tasked the Secretary to make this information available to APANPIRG for subsequent inclusion in the Long Term Height Monitoring Impact Statement along with that information provided by the United States. Additionally the Chairman asked that other RMAs make similar information available to the Secretary prior to September 2010 for inclusion in the report to APANPIRG.

Updated Analysis of RVSM Approval Aircraft Equipage of ADS-B and its Potential for Use as a Height-Keeping Monitoring System in Australian FIRs

5.18 Australia reminded the meeting that at RASMAG/12, an infrastructure plan was developed to assist APANPIRG to make decisions on the best height monitoring systems and their location to acquit the regions responsibilities in relation to the new long term height monitoring requirements being implemented from November 2010. In that plan, RASMAG has proposed that one area that includes Australia, Indonesia, Papua New Guinea and New Zealand could be effectively monitored using a mix of ADS-B and GMUs. As a result, the AAMA had taken steps to identify the number of aircraft types by operator that could potentially be monitored using ADS-B in the period from December 2010 to 12 December 2013, the latter being the currently scheduled time-frame for the introduction of an ADS-B equipage mandate in Australia. An initial analysis was presented to RASMAG/12 in working paper 20. The meeting was informed that the analysis presented in this paper provides an update of that presented in WP/20 at RASMAG/12.

5.19 The meeting was informed that as a first step, the analysis identified the operators using the Australian RVSM airspace. This data was obtained from analysing the flight plan data set for the month of May 2010. Figure 2 and 3 below represents the percentage breakdown of Aircraft using the airspace against ADS-B approval and RVSM Compliance.

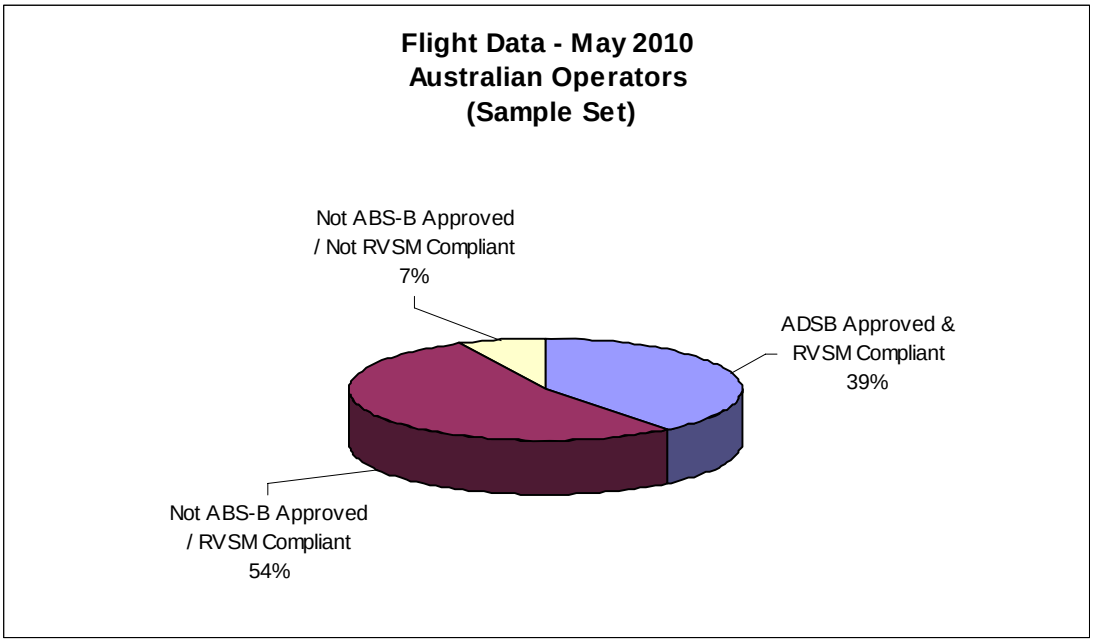

Figure 2

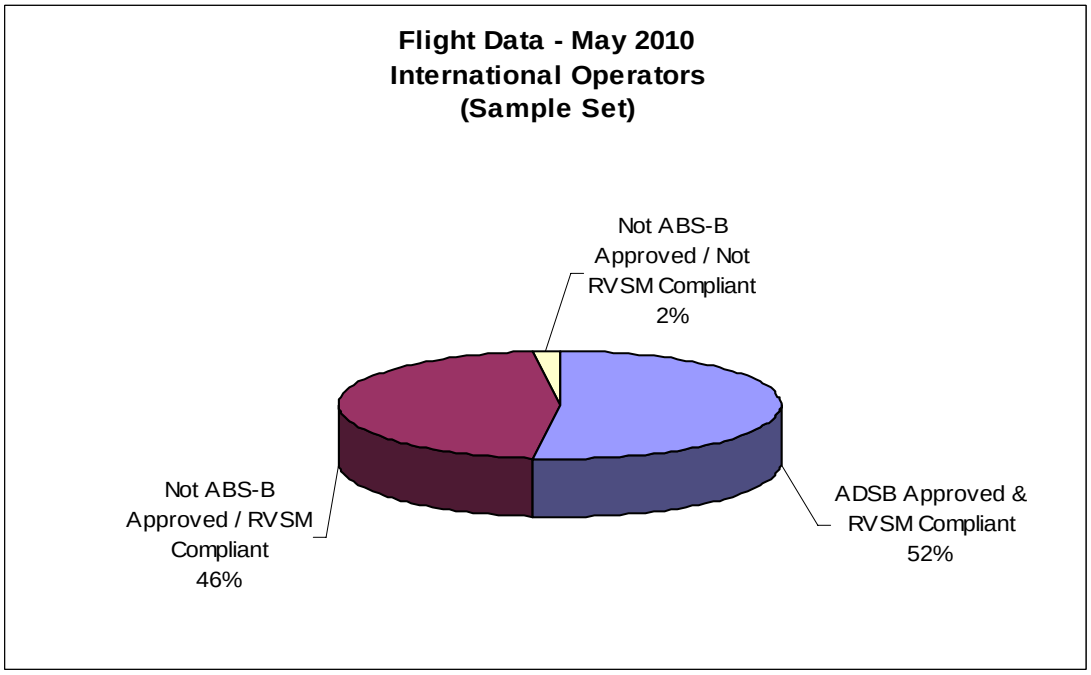

Figure 3

5.20 The data from the flight plan data set for May 2010 shows that 52% of International aircraft flying within the RVSM airspace are both ADS-B approved and RVSM Compliant compared with 39% of Australian operated aircraft. Table 1 below summarises Australian operators that flight planned within the RVSM airspace during May 2010 and whether they have aircraft that are ADS-B equipped that would enable height-keeping monitoring using that system. The shaded Operators have aircraft that are both ADS-B Approved and RVSM Compliant.

Table 1

May 2010 Flight Data - Australian Operators

Operator	Aircraft Type	ADS-B Approved	RVSM Compliant	Total ADS-B Approved Aircraft
AIR NATIONAL AUSTRALIA PTY. LTD.	CL60		Yes	
	LJ35		Yes	
ALLIANCE AIRLINES PTY LTD	F100		Yes	
AUSTRALASIAN JET PTY. LTD.	C551			
AVWEST PTY LTD	CL60		Yes	
	GLF4		Yes	
	H25B		Yes	
BOSTON L.H.F. PTY LTD	H25C		Yes	
BUSINESS AVIATION SOLUTIONS PTY LTD	BE40		Yes	
	C650		Yes	
	C750		Yes	
CAPITEQ LIMITED	E170		Yes	
CAREFLIGHT (QLD) LIMITED	LJ45		Yes	
CELIJET AVIATION SOLUTIONS PTY LTD	C25B		Yes	
CHINA SOUTHERN WEST AUSTRALIAN FLYING COLLEGE PTY LTD	C550			
COLDFOOT CONSULTING PTY LTD	B200		Yes	
CROWN MELBOURNE LIMITED	GLF5		Yes	
DICK SMITH ADVENTURE PTY LTD	C25B		Yes	
EDWARDS COACHES PTY. LIMITED	C525			
EWG AIRCRAFT PTY LTD	B350			
EXECUJET AUSTRALIA PTY LIMITED	GLEX		Yes	
	GLF4		Yes	
	LJ60		Yes	
EXECUTIVE AIRLINES PTY. LTD.	C550		Yes	
FOX AVIATION PTY LTD	C501			
FUGRO SPATIAL SOLUTIONS PTY LTD	C441			
GANDEL INVESTMENTS PTY. LTD.	GLEX		Yes	
GOJET PTY. LTD.	H25B		Yes	
	PRM1		Yes	
GROLLO AVIATION PTY LTD	B350			
INGHAMS ENTERPRISES PTY LIMITED	C650		Yes	
JET CITY PTY. LTD.	C750		Yes	
	LJ35		Yes	
JETSTAR AIRWAYS PTY LIMITED	A320	Yes	Yes	39
	A321	Yes	Yes	3
	A332	Yes	Yes	7
LINFOX GLOBAL CHARTER PTY LTD	GLEX		Yes	
LITTLE AVIATION PTY. LIMITED	F900		Yes	
LLOYD AVIATION JET CHARTER PTY. LTD.	F900		Yes	
LYNDEN AVIATION PTY LIMITED	C650		Yes	
MACARTHUR JET CHARTER PTY LIMITED	C550		Yes	
MARCPLAN CHARTER PTY. LTD.	E135		Yes	
	H25B		Yes	

MAXEM AVIATION PTY LTD	C550			
	C560		Yes	
	CL60		Yes	
NANTAY PTY LTD	H25B		Yes	
	HS25		Yes	
NATIONAL JET EXPRESS PTY LTD	B463			
NATIONAL JET SYSTEMS PTY. LTD.	B712		Yes	
NAURU AIR CORPORATION	B733		Yes	
NETWORK AVIATION PTY LTD	F100		Yes	
PACIFIC FLIGHT SERVICES PTY LTD	LJ35		Yes	
	LJ45		Yes	
PEL-AIR AVIATION PTY LIMITED	LJ35			
	WW24			
PRATT AVIATION PTY LTD	GLEX		Yes	
PROFESSIONAL JET AVIATION PTY LTD	BE40		Yes	
	C550		Yes	
	H25B	Yes	Yes	1
QANTAS AIRWAYS LIMITED	A332	Yes	Yes	5
	A333	Yes	Yes	6
	A388	Yes	Yes	7
	B734		Yes	
	B738	Yes	Yes	11
	B73Y		Yes	
	B744	Yes	Yes	30
	B763		Yes	
QUASAR RESOURCES PTY. LTD.	C550			
RAMSAY AIRCHARTER PTY LIMITED	H25B		Yes	
REVESCO AVIATION PTY LTD	C550			
	CL60		Yes	
SHORTSTOP JET CHARTER PTY. LTD.	C550			
	LJ35			
SKYWEST AIRLINES (AUSTRALIA) PTY LTD	F100		Yes	
SOUTHERN AIR SERVICES PTY LTD	C525		Yes	
SOUTHERN CROSS AIRCRAFT ENGINEERING SERVICES PTY LTD	C525			
STATE OF QUEENSLAND	H25B		Yes	
STRATEGIC AIR CHARTER PTY LTD	C525		Yes	
STRATEGIC AIRLINES PTY. LTD.	A320		Yes	
	A332	Yes	Yes	1
SYDNEY JET CHARTER PTY LIMITED	F2TH		Yes	
TATARY PTY. LTD.	GL5T		Yes	
	H25B		Yes	
TIGER AIRWAYS AUSTRALIA PTY LIMITED	A320	Yes	Yes	8
VIRGIN BLUE AIRLINES PTY LIMITED	B737	Yes	Yes	18
	B738	Yes	Yes	6
	E170		Yes	
	E190		Yes	
VIRGIN BLUE INTERNATIONAL AIRLINES PTY LTD	B77W		Yes	
WALKER AIR SERVICES PTY LIMITED	GLEX		Yes	

5.21 Australia informed the meeting that there were a total of 11 different aircraft type groups identified with aircraft equipped with ADS-B that were operated into Australian airspace by 28 international operators. Of the international operators identified, 19 are based in Asia/Pacific region States. The data suggests that a significant portion of the major airline fleets and specific type groups based in this region already have the potential for being height-monitored using ADS-B within the Australian airspace alone.

5.22 The meeting noted that the AAMA has already held informal discussions with Indonesian authorities to establish the availability of ADS-B data for monitoring purposes. This would enable the monitoring of the extensive Indonesian RVSM approved fleet and also provide monitoring opportunities for other regionally based operators with flights within Indonesian airspace. Further formal discussions with Indonesia are planned for later in 2010.

5.23 The meeting thanked Australia for the detailed analysis and encouraged the AAMA to continue its excellent work with the United States in establishing the viability of ADS-B as a height monitoring means. The United States congratulated the AAMA on the effort in providing this analysis. They also explained that the NAARMO was keen to use ADS-B to measure changes in ASE.

Monitoring Progress of China RMA

5.24 China reported that China RMA had two sets of EGMUs to conduct the aircraft height keeping performance monitoring. China RMA was willing to establish the ground-based monitoring system. China RMA has submitted preliminary results for the ground-based monitoring station site selection in China to the fifth RMA Coordination Meeting (RMA CG/5) which was held in Atlantic City, USA from 3 to 7 May 2010. The meeting was informed that the China RMA is also considering the possibility of buying the COTS ground-based monitoring system.

Progress of Aircraft Height Keeping Performance Monitoring by EGMU and Issues of Ground-Based Monitoring

5.25 China RMA is promoting the Long Term Monitoring program. Since the beginning of 2010, China RMA has provided monitoring service to 54 domestic aircraft.

5.26 At RASMAG/12, China RMA requested the Regional Office to send a State letter to CAAC requesting them to provide China RMA with the necessary support for the establishment of a ground-based monitoring system. In February 2010, ICAO Asia/Pacific Office sent a formal letter to ATMB of CAAC for this issue. In this State letter it was suggested that China consider planning and developing the ground-based monitoring infrastructure in the near future.

5.27 At RASMAG/12, it was suggested that the initial analysis of possible height monitoring infrastructure should be reviewed by each RMA and State represented at RASMAG to consider further details in the interim before RASMAG/13. Based on the Traffic Sample Data of the second half month of December 2009[1], the China RMA completed an analysis to study the methodology of choosing the preliminary site location of the ground-based monitoring system. Considering the possible influence introduced by the change of route structure, more TSD data will be applied before the determination of site location.

[1] Only the second half month (from December 17 to 31) data of Traffic Sample Data were analyzed because the route structure of China was changed on 16 December 2009.

5.28 The meeting noted the excellent work undertaken by China RMA in progressing the establishment of ground-based monitoring systems. The United States commented that China has the largest number of indigenous aircraft in the region, and that the plans that China is making to implement ground based monitoring is a welcome enhancement to assist in the safety of aviation in the region.

Sample Letter Templates for Use by Asia/Pacific RMAs

5.29 China and the United States jointly presented a sample letter for use by RMAs. RASMAG/11 (June 2009, Bangkok) agreed that a standard template letter should be developed from RASMAG for the Asia Pacific RMAs to use to give weight to those requests which have proven difficult to resolve. Such a letter would specify that the request has been made on behalf of RASMAG which has specific empowerment from APANPIRG.

5.30 The letter templates were drafted using the sample letter templates contained in the RMA Manual and actual letters sent by the PARMO, EUROCONTROL, and North Atlantic (NAT) Central Monitoring Agency (CMA) RMAs. Further review was undertaken of Appendix A to WP/16 as this was a new template not supported by the RMA Manual. After some amendments to wording, the meeting agreed to standardise on all the letters for use by Asia Pacific RMAs as in **Appendix I** to this report. The United States suggested that possibly they could establish an Asia/Pac folder on the KSN site where copies of the templates could be stored. This was readily agreed by the meeting. MAAR then raised an issue regarding the fact that previous letters sent by them to States have been ignored while letters from ICAO have generated a response. They suggested that in sending the letter in Appendix A of WP/16, that it would be more effective to have this sent from the ICAO Regional office. The Secretary acknowledged that there may be issues with that process but if the RMA could complete the required areas of the standardised letter, he would arrange for it to be sent by ICAO if possible.

ADS-C/CPCLC Data Link Performance Monitoring

United States

5.31 United States presented WP/20 containing observed CPDLC/ADS-C performance measures as specified in the Global Operational Data Link Document (GOLD) from operational data collected in the Oakland and New York FIRs. These data highlight the difference in communication performance observed between two separate regions. Overall, the observed data link performance in the Oakland FIR is better than that observed in the New York FIR. The communication data observed in the Oakland FIR represents operations in the Pacific where data link issues have been examined over a number of years with an active central reporting agency (CRA). The United States noted the Oakland data reflects the improvements to the system from the implementation of the CRA function.

5.32 In addition, WP/20 provided a summary of observed errors in the estimated time of arrival at the next compulsory waypoint contained in ADS-C position reports received at Oakland and New York oceanic centers. The analysis concentrates on ADS-C reports with the current position time equal to the estimate of time over next compulsory waypoint (e.g. the time interval to next waypoint given as zero). The results show a pattern associated with the time of day for ADS-C reports originating from a specific aircraft manufacturer. The FAA has notified the aircraft manufacturer of the problem and the aircraft manufacturer has responded and indicated that the problem has been identified and plans a fix for 2012.

5.33 The PowerPoint Presentation by the United States is attached as **Appendix J** to this report.

5.34 The meeting thanked the United States for the detailed analysis. United States noted that a lot of monitoring of this type of data already takes place in the NAT and through the FITs in the Pacific. As a result the EMAs will need to become more active in undertaking this type of monitoring particularly where separation standards require specific communications requirements are met. New Zealand commented that this type of analysis is essential in being able to pinpoint issues with operators, aircraft types or even specific airframes, and therefore allowing follow-up to resolution. New Zealand also noted some concerns with regards to future availability and needs for satellite communication systems and the level of protection being provided to band width available to aviation industry. The meeting agreed these issues would need to be monitored by RASMAG.

New Zealand

5.35 New Zealand reminded the meeting that one of the tasks of the RASMAG is "to review the safety monitoring programmes in the Asia and Pacific Regions for implementation and operation of aircraft separation applications using data link". This type of monitoring work is undertaken by the Central Reporting Agencies (CRAs) of the Asia Pacific Region. However, to date, very little formal reporting has been made available to the RASMAG. The ISPACG CRA publishes a collection of data link monitoring data summaries on its website at http://www.ispacg-cra.com/performance.asp. The information is presented by aircraft type and by operator (all data is de-identified), and provides a useful overview of data link performance in the South Pacific. These data include:

- CPDLC Performance;
- Actual Communications Technical Performance (ACTP);
- Actual Communications Performance (ACP);
- Flight Crew Response; and
- ADS-C Performance.

5.36 The meeting reviewed a trend analysis of data link performance monitoring within the Auckland Oceanic FIR presented by New Zealand. The statistics data collected since December 2008 indicates that while the safety targets for network availability are being achieved at present, it is clear that considerable improvement is necessary for the efficiency target to be met. The efficiency target supports operational efficiency and orderly flow of air traffic. It was demonstrated that the nominal times for CPDLC and ADS-C continuity are being achieved.

5.37 The meeting thanked New Zealand for bringing this information to its attention and hoped that further data of this type could be provided at future meetings.

Analysis of ATC to ATC Coordination Errors between Australia and Indonesia

5.38 The AAMA informed the meeting that as part of its safety assessment activity, it has kept a focus on incidents and associated safety risks involving Australia's airspace boundaries and in particular with the two Indonesian FIRs; Ujung Pandang and Jakarta. The reason behind this is that the air routes spanning these boundaries carry a significant amount of international traffic to and from the Australian FIRs and have provided the largest number of ATC to ATC coordination and pilot failure to comply incidents of any FIR interfaces relative to Australian airspace. Notably, AIDC as a coordination means has not been implemented between Indonesia and Australia.

5.39 This analysis is based on data extracted from the Airservices ESIR database for the 6-month period between 1 January 2010 up to and including 30 June 2010. An initial review of the data identified 116 ESIR reports for the reporting period. Figure 4 shows the distribution of the Occurrence attribution over the reporting period.

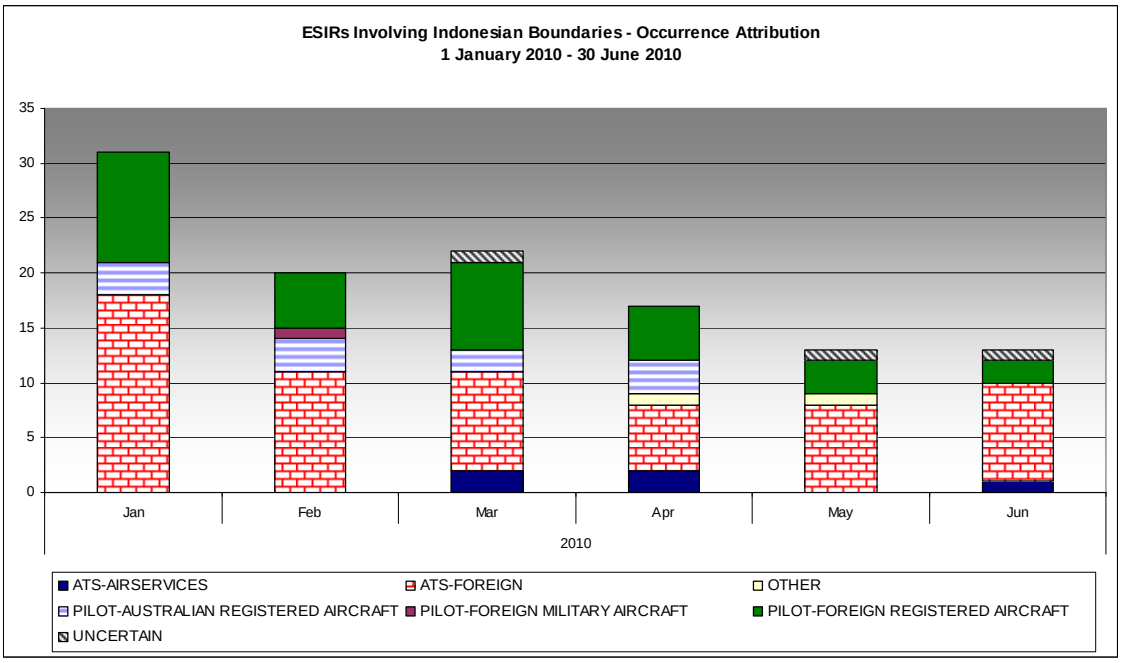

Figure 4: Occurrence Attribution for ESIRs involving boundaries with Indonesia.

5.40 Figure 5 shows a breakdown of Occurrence Attribution against Occurrence Type for ESIRs involving Indonesian boundaries.

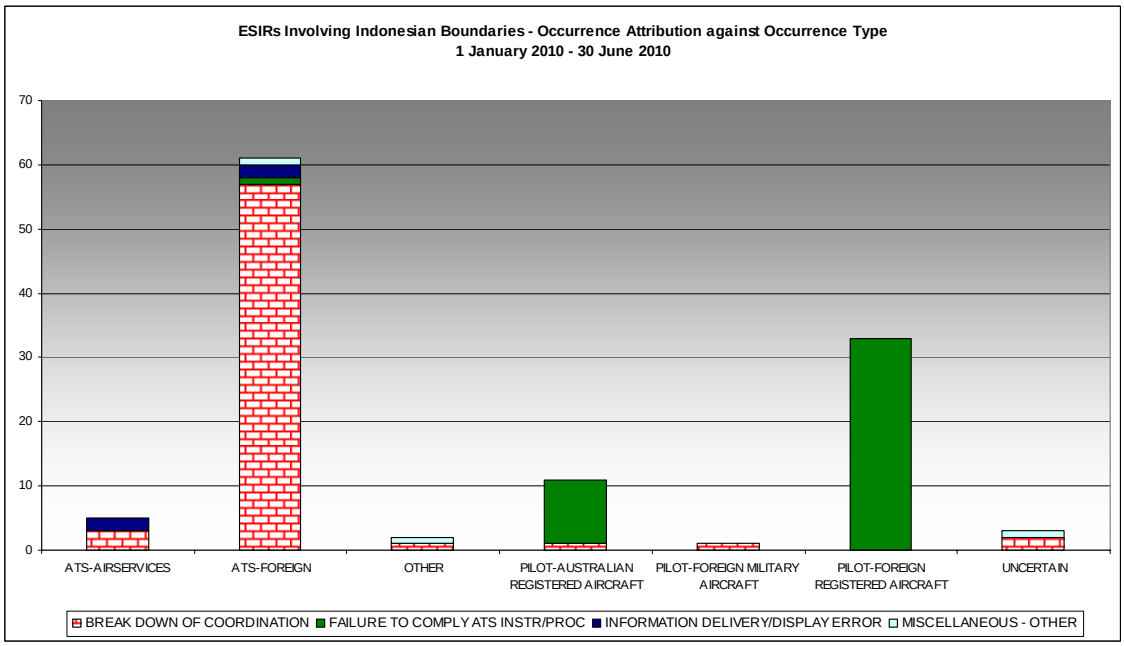

Figure 5: Occurrence Attribution against Occurrence Type for ESIRs involving boundaries with Indonesia.

5.41 The meeting was informed that a detailed analysis of the 56 reports attributed to Indonesian ATS shows:

- Coordination of Boundary Estimates and Levels were at error in 21 reports. Of these 15 were categorised as 'Incorrect/Incomplete'; the remaining were either late coordination (n=4) or not coordinated at all where aircraft called at the boundary (n=2).

- A further 7 reports involved errors in the coordination of flight level. Of these, 6 reports were 'Incorrect/Incomplete' while in one report there was no coordination at all.

- The remaining 28 were categorised as 'Other'. Of these, there were; 16 'Incorrect/Incomplete' coordination; 13 of which involved errors in route diversions. The remaining includes one report each of errors in level, revised estimate and flight plan coordination.

- There were 10 total failures to coordinate: track diversions (n=7); revised estimates for waypoints (n=2); and one report of an aircraft taxying for departure from Bali (as per Airservices' Letter of Agreement). The remaining two reports were of late coordination of aircraft entering the Australian FIR where notice of aircraft was received inside the prescribed 30 minute window.

5.42 The AAMA commented that the reliance on human interaction and communication is a source for many of the errors identified in the incidents in this review. The use of AIDC has demonstrated that automated coordination significantly reduces the opportunity for errors in coordination. Currently AIDC is being trialed between Airservices and the Indonesian service provider responsible for Ujung Pandang FIR. Airservices expects that full operational implementation of AIDC between Airservices and the Indonesian service providers will result in a significant reduction in the number of incidents reported. The AAMA will provide further data at future meetings that will measure any change to the number of coordination errors as a result of the implementation of AIDC. Additionally, the AAMA expects to see a marked decrease in the number of errors related to aircraft deviations as ADS-B becomes more widely fitted to aircraft and the ADS-B data sharing between Australia and Indonesia enables enhanced surveillance capability across the FIR boundaries.

5.43 The meeting thanked Australia for the information contained in the paper and the United States stated that they looked forward to the results of the introduction of AIDC and asked if Australia could provide further analyses of this type.

Safety Assessment of 50 NM Lateral Separation on North Pacific (NOPAC) Routes

5.44 Japan has implemented RNP 10 based 50 NM lateral separation minimum in the Pacific oceanic airspace since April 1998. The reporting procedure of large lateral deviations have been established by the letter of agreement (LOA) between FAA and JCAB titled "Monitoring of Aircraft Navigation Errors in the North and Central Pacific", which defines FAA's Technical Center as a Monitoring Authority.

5.45 Mathematicians of the Electronic Navigation Research Institute (ENRI) in Japan practiced safety assessment before and after the implementation of RNP-10 based 50NM lateral reduced separation minimum to the Pacific oceanic airspace.

Results of Analysis

Reports of Large Lateral Deviations (LLDs)

5.46 Although the EMA Handbook defines LLD as *Any deviation of 15NM or more to the left or right of the current flight-plan track*, Japan RMA collected the deviation of 20NM or more in accordance with the current LOA between FAA and JCAB. There was no report of a deviation of 20 NM or more in the NOPAC airspace between May 2009 and April 2010.

Characteristics of NOPAC Routes - Know Your Airspace (KYA) Analysis

5.47 NOPAC routes have been established as conventional ATS routes, thus not exclusive PBN routes. NOPAC routes are aligned 50NM parallel and 99% of the aircraft flying NOPAC routes hold RNP-10 operational approval. On the NOPAC routes, 50 NM lateral reduced separation minimum is applied between RNP 10 approved aircraft, between RNP 4 approved aircraft, and between RNP 10 approved aircraft and RNP 4 approved aircraft.

5.48 **Table 2** shows count of flights on NOPAC routes. The proportion of utilization of NOPAC routes is not balanced. Westbound traffic mainly uses R220 and eastbound traffic mainly uses A590.

Route	Count	Proportion	Cumulative Count	Cumulative Proportion
R220	2028	41.89%	2028	41.89%
R580	399	8.24%	2427	50.13%
A590	1867	38.57%	4294	88.70%
R591	411	8.49%	4705	97.19%
G344	136	2.81%	4841	100.00%
NOPAC Total	4841	100.00%	-	-

Table 2: Count of flights on NOPAC routes

5.49 **Table 3** shows frequently flying aircraft types observed in the traffic sample. A total of 36 aircraft types were observed in the December 2009 TSD on NOPAC routes.

	Total number of Type =	**36**			
Number	Type	Count	Proportion	Cumulative Count	Cumulative Proportion
1	B744	2090	43.17%	2090	43.17%
2	MD11	671	13.86%	2761	57.03%
3	B772	633	13.08%	3394	70.11%
4	B77W	606	12.52%	4000	82.63%
5	B742	220	4.54%	4220	87.17%
6	B763	169	3.49%	4389	90.66%
7	A343	83	1.71%	4472	92.38%
8	B77L	74	1.53%	4546	93.91%
9	A346	55	1.14%	4601	95.04%

10	A332	32	0.66%	4633	95.70%
11	A333	31	0.64%	4664	96.34%
11	A345	31	0.64%	4695	96.98%
13	B743	23	0.48%	4718	97.46%
14	GLF5	20	0.41%	4738	97.87%
14	C17	20	0.41%	4758	98.29%
16	B752	16	0.33%	4774	98.62%
17	GLEX	10	0.21%	4784	98.82%
18	K35R	7	0.14%	4791	98.97%
19	GLF4	6	0.12%	4797	99.09%
20	F900	5	0.10%	4802	99.19%

Table 3: Top 20 aircraft types on NOPAC routes

Estimate of Lateral Collision Risk for NOPAC Routes

5.50 **Table 4** shows estimates of lateral collision risk for NOPAC routes.

Source of Risk	Risk Estimation
N_{ay} (same)	8.7272×10^{-16}
N_{ay} (opposite)	2.21561×10^{-15}
N_{ay} (total)	**3.0883×10^{-15}**

Table 4: Lateral collision risk estimates for the NOPAC routes

5.51 Japan RMA has recognised that it should change the definition of the size of LLD from 20NM to 15NM in accordance with the EMA Handbook, and should notify the change to ATC facilities in Japan. JCAB and FAA have coordinated about the cancellation of the existing bilateral LOA, and agreed to do it once Japan RMA is approved as one of the APANPIRG EMAs.

5.52 The meeting congratulated Japan on the preparation of this detailed paper and stated that it looked forward to further papers as Japan developed its EMA capability.

India's Progress towards Establishment of Enroute Monitoring Agency (EMA) – BOBASMA

5.53 In 2004, RASMAG recognized the need for safety monitoring activities to be carried out to support improvements to air traffic management for the region in a safe and systematic manner. In 2009, APANPIRG adopted the change in name from SMA to En-route Monitoring Agency (EMA) to better reflect the duties and responsibility of the EMA.

Progress Made towards Establishment of EMA

5.54 India is progressing in establishment of En-route Monitoring Agency for airspace over Bay of Bengal, Arabian Sea and Indian Ocean with assistance and guidance of the FAA. Airports Authority of India has formed a Team of experts from Air Traffic Management, Safety, avionics and mathematical/statistical background. The team will visit the FAA Technical Center, Atlantic City, USA in August 2010 to understand the safety monitoring establishment and its operation.

5.55 During BOB-RHS/TF/3 held in Singapore in May, 2010, the Indian delegates visited Singapore ACC and the Enroute Monitoring Agency for South China Sea (SEASMA) for understanding the functions of EMA. Singapore presented a power point presentation to Indian delegates who gave a general background of functions of an Enroute Monitoring Agency and its duties and responsibilities in supporting the introduction and continued use of Enroute horizontal-plane separation minima. The collection of GNE data has commenced in all Indian FIRs on selected routes effective 1 July 2010. Draft Letter of Agreement proposed by India in line with EMA Handbook & identifying various FIRs/ACCs (States) to be the Signatory in this LOA has been modified as suggested in the ATM/AIS/SAR/SG meeting in July 2010. Commencement of GNE data analysis by Indian EMA for Indian FIRs likely by 1 September 2010 so as to submit the first safety analysis report in the forthcoming FIT-BOB-13 & BOB-RHS/TF/4 meetings.

5.56 The meeting thanked India for the information and encouraged them to continue their work to develop capabilities that would enable them to be endorsed as an EMA. The Chairman also reminded India of the need to present their credentials to RASMAG in relation to establishing their capability to under take the required technical work of an EMA. The process for endorsing an EMA is detailed in the EMA Manual. The United States commented that the FAA was working closely with India to provide the necessary training leading to EMA endorsement.

Agenda Item 6: Review and Update RASMAG Task List

6.1 The meeting agreed that the updated task list included as **Appendix K** to this report accurately reflected the work programme of RASMAG.

Agenda Item 7: Any Other Business

Review of Conclusions and Decisions of APANPIRG/20

7.1 The meeting reviewed the list of Conclusions and Decisions from APANPIRG/20 with respect to ATM/AIS/SAR issues.

Review of Membership of RASMAG

7.2 The meeting discussed the current membership arrangements of RASMAG noting that the Secretary advised that invitations to meetings are only issued to those members who had attended the previous meeting. Further discussion saw the meeting agree that in line with other sub-groups, invitations to attend RASMAG meetings should be provided to all States in the region. The Secretary agreed to adjust the notification process accordingly.

Agenda Item 8: Date and Venue of the Next RASMAG Meeting

8.1 With regards to the scheduling of the next meeting, it was tentatively agreed that RASMAG/14 would be held in from 14 to 18 February 2011 at the Regional Office premises.

8.2 The Secretariat would make appropriate arrangements and issue meeting invitations in due course.

9. Closing of the meeting

9.1 The Chairman, Mr. Butcher, thanked the meeting participants for their significant work during a busy meeting program.

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LIST OF INFORMATION AND WORKING PAPERS

WORKING PAPERS

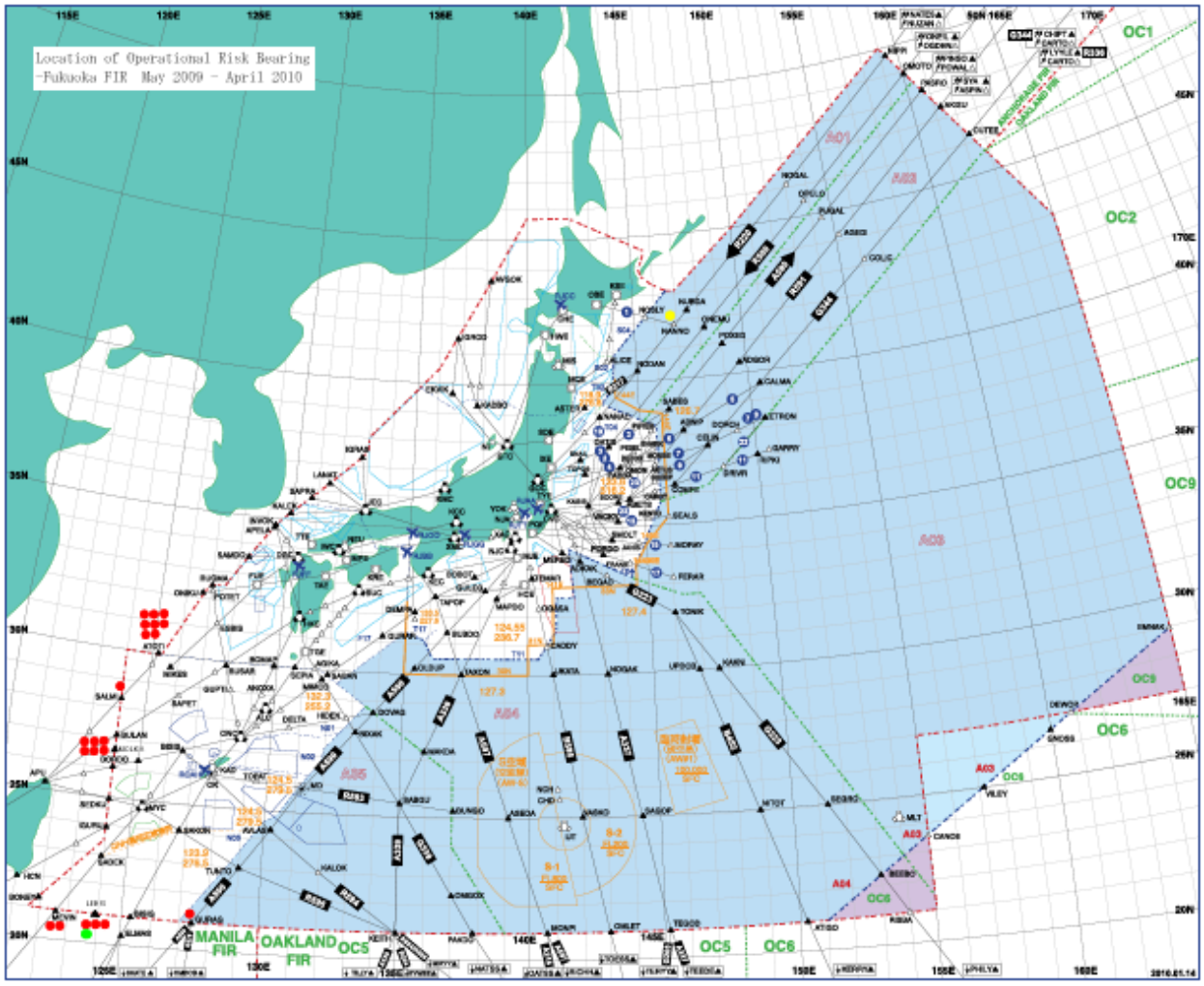
NUMBER	AGENDA	TITLE	PRESENTED BY
WP/1	1	Provisional Agenda	Secretariat
WP/2	2	Outcome of the Sixth Meeting of PBN Task Force (PBN TF/6)	Secretariat
WP/3	2	Review Outcomes of the 17th Meeting of Southeast Asia ATM Coordination Group (SEACG/17)	Secretariat
WP/4	4	Global Operational Data Link Document (GOLD)	Secretariat
WP/5	5	Review of RASMAG List of Competent Airspace Safety Monitoring Organizations	Secretariat
WP/6	6	Review of RASMAG Task List	Secretariat
WP/7	7	Review and Update Conclusions and Decisions of APANPIRG	Secretariat
WP/8	3	Safety Assessment of RVSM within the Fukuoka Flight Information Region	Japan
WP/9	2	Review Report of ATM/AIS/SAR/SG/20	Secretariat
WP/10	5	Establishment of PBN Approvals Database	Japan
WP/11	5	Analysis to determine the Potential of the First Height Monitoring Unit (HMU) in Japan	Japan
WP/12	3	Safety Monitoring Report from the Pacific Approvals Registry and Monitoring Organization May 2009 – April 2010	PARMO
WP/13	5	The Pacific Approvals Registry and Monitoring Organization (PARMO) Assessment of the Monitoring Responsibility Associated with the Long-Term Height Monitoring Requirements	PARMO
WP/14	3	Safety Assessment of RVSM within the Flight Information Regions Monitored by the AAMA	Australia
WP/15	2	Assessment of Non-State-Approved Operators using Pacific RVSM Airspace	PARMO
WP/16	5	Sample Letter Templates for Use by Asia/Pacific RMAs	PARMO China RMA
WP/17	5	Identification of Non-Approved Airframes Operating With RVSM Approval Status	Australia
WP/18	2	SASP Review of Draft Revision of Doc 9574 and Proposed RASMAG Amendment	Australia
WP/19	3	Treatment of Flight Levels Crossed in the Assessment of Vertical Collision Risk	United States
WP/20	5	CPDLC/ADS-C Data Link Performance Monitoring	PARMO

NUMBER	AGENDA	TITLE	PRESENTED BY
WP/21	5	Updated Estimate of RVSM Long-Term Height Monitoring Burden for the Australian Airspace Monitoring Agency (AAMA)	Australia
WP/22	4	Proposed Changes to the Asia/Pacific Region En-Route Monitoring Agency (EMA) Handbook	Singapore
WP/23	5	Monitoring Progress of China RMA	China RMA
WP/24	3	Safety Monitoring Report from China Regional Monitoring Agency July 2009 – June 2010	China RMA
WP/25	3	Monitoring of Non-RVSM-Approved Aircraft Operating in the RVSM Airspace of the Asia Region	MAAR
WP/26	5	Updated Analysis of RVSM Approved Aircraft Equipage of ADS-B and its Potential for Use as a Height-Keeping Monitoring System in the Australian FIRs	Australia
WP/27	5	Analysis of ATC to ATC Coordination Errors between Australian and Indonesian Airspace	Australia
WP/28	5	Safety Assessment of 50NM Lateral Separation on North Pacific (NOPAC) Routes	Japan
WP/29	3	Report from South East Asia Safety Monitoring Agency : May 2009 – April 2010	SEASMA
WP/30	3	Summary of the Airspace Safety Review for the RVSM Operation in Asia Region	MAAR

INFORMATION PAPERS

NUMBER	AGENDA	TITLE	PRESENTED BY
IP/1	-	List of Working Papers (WPs) and Information Papers (IPs)	Secretariat
IP/2	-	Terms of Reference of the Regional Airspace Safety Monitoring Advisory Group (RASMAG)	Secretariat
IP/3	2	Summary Report of the 12th Meeting of the FANS Implementation Team for the Bay of Bengal (FIT-BOB/12)	Secretariat
IP/4	2	Summary Report of the 10th Meeting of FANS Implementation Team for South-East Asia (FIT-SEA/10)	Secretariat
IP/5	3	Observed Effect of the Implementation of AIDC between Republic Of Korea and Japan on the Occurrence of Category E/F LHDs	PARMO
IP/6	3	Assessment of Non-State-Approved Operators using Domestic Chinese RVSM Airspace	China RMA
IP/7	5	RVSM Implementation in Ulaanbaatar FIR	MAAR
IP/8	5	Data Link Performance Monitoring Results	New Zealand
IP/9	5	India's Progress Towards Establishment Of Enroute Monitoring Agency (EMA) - BOBASMA	India

Geographical locations where LHDs contributed to the operational risk occurred



Red color dot ●:
Coordination errors in the ATC- ATC transfer of control - human factors

Green color dot ●:
Coordination errors in the ATC -ATC transfer of control -equipment outage

Yellow color dot ●:
Flight crew climbing without ATC clearance

Suggested Form for ATC Unit Monthly Report of Large Lateral Deviations or Large Longitudinal Errors

[EN-ROUTE MONITORING AGENCY NAME]

Report of Large Lateral Deviation or Large Longitudinal Error

Report to the (*En-route Monitoring Agency Name*) of a large lateral deviation (LLD) or a large longitudinal error (LLE), ~~including those due to weather deviations and other contingency events~~, as defined below:

*Note: Do not include ATC-approved deviation due to weather or other contingency events, unless the deviation occurred is greater than the approved deviation.

Type of Error	Category of Error	Criterion for Reporting
Lateral deviation	Individual-aircraft error	15NM or greater magnitude
Longitudinal deviation	Aircraft-pair (Time-based separation applied)	Infringement of longitudinal separation standard based on routine position reports
Longitudinal deviation	Aircraft-pair (Time-based separation applied)	Expected time between two aircraft varies by 3 minutes or more based on routine position reports
Longitudinal deviation	Individual-aircraft (Time-based separation applied)	Pilot estimate varies by 3 minutes or more from that advised in a routine position report
Longitudinal deviation	Aircraft-pair (Distance-based separation applied)	Infringement of longitudinal separation standard, based on ADS, radar measurement or special request for RNAV position report
Longitudinal deviation	Aircraft-pair (Distance-based separation applied)	Expected distance between an aircraft pair varies by 10NM or more, even if separation standard is not infringed, based on ADS, radar measurement or special request for RNAV position report

Name of ATC unit: _____

Please complete Section I or II as appropriate

SECTION I:

There were no reports of LLDs or LLEs for the month of _____

SECTION II:

There was/were _____ report(s) of LLD

There was/were _____ report(s) of LLE

Details of the LLDs and LLEs are attached.

(Please use a separate form for each report of lateral deviation or longitudinal error).

When complete please forward the report(s) to:

En-route Monitoring Agency Name
Postal address
Telephone:
Fax:
E-Mail:

NAVIGATION ERROR INVESTIGATION FORM

PART 1 - **To be completed by responsible officer in the Service Provider (and aircraft owner/operator if need)**		
ATC Unit Observing Error:		
Date/Time (UTC):		
Duration of Deviation:		
Type of Error: (tick one) ☐ LATERAL ☐ LONGITUDINAL		
Details of Aircraft		
	First Aircraft	**Second Aircraft** (when longitudinal deviation observed)
Aircraft Identification:		
Name of owner/Operator:		
Aircraft Type:		
Departure Point:		
Destination:		
Route Segment:		
Cleared Track:		
Position where error was observed: (BRG/DIST from fixed point or LAT/LONG)		
Extent of deviation – magnitude and direction: (NM for lateral, min/NM for longitudinal)		
Flight Level:		
Approximated Duration of Deviation (minutes)		
For All Errors		
Action taken by ATC:		
Crew Comments when notified of Deviation:		
Other Comments:		

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

NAVIGATION ERROR INVESTIGATION FORM

PART 2 - **Details of Aircraft, and Navigation and Communications Equipment Fit (To be completed by aircraft owner/operator)**			
LRNS	**Number of Systems** (0, 1, 2 etc.)	**Make**	**Model**
INS			
IRS			
GNSS			
FMS			
Others (please Specify)			
COMS			
HF			
VHF			
SATCOM			
CPDLC			
Which navigation system was coupled to the autopilot at the time of observation of the error?			
Which Navigation Mode was selected at the time of observation of the error?			
Which Communication System was in use at the time of observation of the error?			
Aircraft registration			
Aircraft model/series			
Was the aircraft operating according to PBN requirements?		☐ Yes	☐ No

NAVIGATION ERROR INVESTIGATION FORM

PART 3 **Detailed description of incident (To be completed by owner/operator – use separate sheet if required)**
Please give your assessment of the actual track flown by the aircraft, and the cause of the deviation:
Corrective action proposed:

PART 4 **To be completed by owner/operator, only in the event of partial or total navigation equipment failure.**			
Navigation System Type	**INS**	**IRS/FMS**	**Others (Please specify)**
Indicate the number of units of each type which failed			
Indicate position at which failure(s) occurred			
Give an estimate of the duration of the equipment failure(s)			
At what time were ATC advised of the failure(s)?			

NAVIGATION ERROR INVESTIGATION FORM

PART 5 **To be completed by investigating agency**		
Have all required data been supplied?	☐ Yes	☐ No
Is further investigation warranted?	☐ Yes	☐ No
Will this incident be the subject of a separate report?	☐ Yes	☐ No
Description of Error:		
Classification: (please tick) ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I		
CLASSIFICATION OF NAVIGATION ERRORS		
Cause of Deviation		
Operational Errors		
A	Flight crew deviate without ATC Clearance;	
B	Flight crew incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance etc.);	
C	Flight crew waypoint insertion error, due to correct entry of incorrect position or incorrect entry of correct position;	
D	ATC system loop error (e.g. ATC issues incorrect clearance, Flight crew misunderstands clearance message etc);	
E	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility;	
Deviation due to navigational errors		
F	Navigation errors, including equipment failure of which notification was not received by ATC or notified too late for action;	
Deviation due to Meteorological Condition		
G	Turbulence or other weather related causes (other than approved);	
Others		
H	An aircraft without PBN approval;	
I	Others (Please specify)	

APANPIRG Asia/Pacific Airspace Safety Monitoring

RASMAG LIST OF COMPETENT AIRSPACE SAFETY MONITORING ORGANIZATIONS

The Regional Airspace Safety Monitoring Advisory Group of APANPIRG (RASMAG) is required by its terms of reference to recommend and facilitate the implementation of airspace safety monitoring and performance assessment services and to review and recommend on the competency and compatibility of airspace monitoring organizations. In order to assist in addressing these requirements, RASMAG updates and distributes the following list of competent airspace safety monitoring organizations for use by States requiring airspace safety monitoring services. In the context of the list, abbreviations have meanings as follows:

- RMA – Regional Monitoring Agency – safety assessment and monitoring in the vertical plane (i.e. RVSM);
- EMA – En-route Monitoring Agency – safety assessment and monitoring in the horizontal plane (i.e. RVSM, RNAV10, RNP4);
- CRA – Central Reporting Agency – technical performance of data link systems (i.e. ADS/CPDLC); and
- FIT – FANS 1/A Interoperability/Implementation Team – parent body to a CRA.

(Last updated 17 December 2009)

Organisation *(including contact officer)*	State	Competency	Status	Airspace assessed (FIRs)
Australian Airspace Monitoring Agency (AAMA) - Airservices Australia http://www.airservicesaustralia.com/organisations/aama/default.asp Mr. Robert Butcher, Operational Analysis Manager, Safety and Environment Group email: robert.butcher@airservicesaustralia.com or aama@airservicesaustralia.com	Australia	APANPIRG RMA	Current	Brisbane, Honiara, Jakarta, Melbourne, Nauru, Port Moresby and Ujung Pandang FIRs.
		EMA	Current	Brisbane, Melbourne FIRs.

Organisation *(including contact officer)*	State	Competency	Status	Airspace assessed (FIRs)
China RMA - **Air Traffic Management Bureau, (ATMB) of Civil Aviation Administration of China (CAAC)** http://www.chinarma.cn (secure site) Mr. Tang Jinxiang, Engineer of Safety and Monitoring Technical Group, ATMB email: tangjx@adcc.com.cn	China	APANPIRG RMA	Current	Beijing, Guangzhou, Kunming, Lanzhou, Shanghai, Shenyang, Urumqi Wuhan Sanya and Pyongyang FIR.
JCAB RMA - **Japan Civil Aviation Bureau** Mr. Noritoshi Suzuki, Special Assistant to the Director, Flight Procedures and Airspace Program Office, email: suzuki-n248@mlit.go.jp	Japan	APANPIRG RMA	Current	Fukuoka FIR
		EMA	Available fourth quarter – 2009	Fukuoka FIR
Monitoring Agency for the Asia Region (MAAR) – Aeronautical Radio of Thailand LTD http://www.aerothai.co.th/maar Mr. Nuttakajorn Yanpirat, Executive Officer, Systems Engineering,Aeronautical Radio of Thailand Ltd. email: nuttakajorn.ya@aerothai.co.th or maar@aerothail.co.th	Thailand	APANPIRG RMA	Current	Bangkok, Kolkatta, Chennai, Colombo, Delhi, Dhaka, Hanoi, Ho Chi Minh, Hong Kong, Karachi, Kathmandu, Kota Kinabalu, Kuala Lumpur, Lahore, Male, Manila, Mumbai, Phnom Penh, Singapore, Taibei, Ulaan Bataar, Vientiane, Yangon FIRs

Organisation *(including contact officer)*	State	Competency	Status	Airspace assessed (FIRs)
Pacific Approvals Registry and Monitoring Organization (PARMO) – Federal Aviation Administration (US FAA) http://www.faa.gov/air_traffic/separation_standards/parmo/ Mr. Dale Livingston, Manager, Separation Standards Analysis Team, FAA, email: dale.livingston@faa.gov or aparmo@faa.gov	USA	APANPIRG RMA	Current	Anchorage Oceanic, Auckland Oceanic, Incheon, Nadi, Oakland Oceanic, Tahiti FIRs
		EMA	Current	Anchorage Oceanic, Oakland Oceanic
South East Asia Safety Monitoring Agency (SEASMA) - Civil Aviation Authority of Singapore (CAAS) Mr. Kuah Kong Beng, Chief Air Traffic Control Officer, email: KUAH_Kong_Beng@caas.gov.sg	Singapore	EMA for South China Sea	Current	Hong Kong, Ho Chi Minh, Kota Kinabalu, Kuala Lumpur, Manila, Sanya and Singapore FIRs
FIT - SEA (ICAO Regional Office email icao_apac@bangkok.icao.int & **CRA Japan** Mr. Mitsuo Hayasaka, Deputy Director, Air Traffic Control Association Japan, email:hayasaka@atcaj.or.jp	ICAO Regional Office & CRA Japan	FIT & CRA	Current	South China Sea FIRs

Organisation *(including contact officer)*	State	Competency	Status	Airspace assessed (FIRs)
IPACG/FIT Mr. Takahiro Morishima, JCAB Co-Chair email: morishima-t2zg@mlit.go.jp & Mr. Reed Sladen, FAA Co-Chair, email: reed.b.sladen@faa.gov	Japan & USA	FIT & CRA	Current	North & Central Pacific (Oceanic airspace within Fukuoka FIR, and Anchorage & Oakland FIRs)
CRA Japan Mr. Mitsuo Hayasaka, Deputy Director, Air Traffic Control Association Japan, email: hayasaka@atcaj.or.jp	Japan	CRA	Current	Fukuoka FIR for IPACG/FIT Ho Chi Minh, Manila, Singapore FIRs for FIT-SEA
FIT - BOB ICAO Regional Office email icao_apac@bangkok.icao.int & Mr. Bradley Cornell, Boeing Engineering email: Bradley.D.Cornell@Boeing.Com	ICAO Regional Office & Boeing USA	FIT & CRA	Current	Bay of Bengal FIRs, Ujung Pandang and Jakarta FIRs, provides assistance to the members of the Arabian Sea/Indian Ocean ATS Coordination Group (ASIOACG)
ISPACG/FIT Mr. Bradley Cornell, Boeing Engineering email: Bradley.D.Cornell@Boeing.Com	Boeing USA	FIT & CRA	Current	South Pacific FIRs and members of the Informal South Pacific ATS Coordination Group (ISPACG)

Japan RMA FORM F2
RECORD OF APPROVAL TO OPERATE IN RVSM AIRSPACE AND ON PBN ROUTES

1. When a State of Registry approves or amends the approval of an operator/aircraft for operations in RVSM airspace and/or on PBN routes, details of that approval must be recorded and sent to the Japan Regional Monitoring Agency (Japan RMA) to reach it by the tenth day of the month following the month that the approval was issued.

2. *Before providing the information as requested below, reference should be made to the accompanying notes* **(PLEASE USE BLOCK CAPITALS)**.

State of Registry[1]:

Name of Operator[2]:

State of Operator[1]:

Aircraft Type[3]:

Aircraft Series[4]:

Manufacturers Serial No:

Registration No:

Mode S Address Code[5]:

Airworthiness Approval[6]:

Date Issued (mmddyy)[7]:

		Issued Date of Operational Approval[7]	Expiry Date (If Applicable)[7]
RVSM Operational Approval[6]:			
RNAV10(RNP10) Operational Approval[6]:			
RNAV5 Operational Approval[6]:			
RNAV1and2 Operational Approval[6]:			
RNP APCH Operational Approval[6]:			
RNP4 Operational Approval[6]:			

Remarks[8]:

1. Enter the 1 or 2 letter ICAO identifier as contained in ICAO Doc7910, Index to Nationality Letters for Location Indicators. In the case of there being more than one identifier designated for the State, use the identifier that appears first.

   ICAO State Code for Japan: **RJ**

2. Enter the operator's 3 letter ICAO identifier as contained in ICAO Doc 8585.
   For International General Aviation, enter "**IGA**".
   For Military Aircraft, enter "**MIL**".
   If none, place an **X** in this field and write the name of the operator/owner in the Remarks row.

3. Enter the ICAO designator as contained in ICAO Doc8643, e.g., for Airbus A320-211, enter A320; for Boeing B747-438 enter B744.

4. Enter series of aircraft type or manufacturer's customer designation, e.g., for Airbus A320-211, enter 211; for Boeing B747-438, enter 400 or 438.

5. Enter ICAO allocated Aircraft Mode S address code (in hexadecimal).
   *This Mode S address code begins with the proper bit string **84, 85, 86, 87** as defined by ICAO for Japanese-registered aircraft.*

6. Enter state of approval for yes, enter "**Y**", for no, enter "**N**".

7. Example: For July 31, 2008 write 073108.
   Fill in Initial Airworthiness Approval Date and Initial RVSM Operational Approval Date for International General Aviation.

8. Use a separate sheet of paper if insufficient space available.

When complete, please return to the following address by the next business day:

Civil Aviation Bureau of Japan
Flight Procedures and Airspace Program Office
Air Traffic Control Division, Air Traffic Services Department
Japan Civil Aviation Bureau Regional Monitoring Agency
2-1-3, Kasumigaseki, Chiyoda-ku, Tokyo, 100-8918, JAPAN

Telephone: +81-3-5253-8111 ext.51238
Fax: +81-3-5253-1664
E-Mail: RVSM_report@mlit.go.jp

Japan RMA FORM F3
WITHDRAWAL OF APPROVAL TO OPERATE IN RVSM AIRSPACE AND ON PBN ROUTES

1. When a State of Registry has cause to withdraw the approval of an operator/aircraft for operations in RVSM airspace and/or on PBN routes, details as requested below, must be submitted to the Japan Regional Monitoring Agency (Japan RMA) by the most appropriate method.

2. *Before providing the information as requested below, reference should be made to the accompanying notes* **(PLEASE USE BLOCK CAPITALS)**.

State of Registry[1]:

Name of Operator[2]:

State of Operator[1]:

Aircraft Type[3]:

Aircraft Series[4]:

Manufacturers Serial No:

Registration No:

Mode S Address Code[5]:

Date of Withdrawal of RVSM Approval[6]:

Date of Withdrawal of RNAV10 (RNP10) Approval[6]:

Date of Withdrawal of RNAV5 Approval[6]:

Date of Withdrawal of RNAV1and2 Approval[6]:

Date of Withdrawal of RNP APCH Approval[6]:

Date of Withdrawal of RNP4 Approval[6]:

Reason of Withdrawal of Approval[7]

Remarks[7]:

1. Enter the 1 or 2 letter ICAO identifier as contained in ICAO Doc7910, Index to Nationality Letters for Location Indicators. In the case of there being more than one identifier designated for the State, use the identifier that appears first.

   ICAO State Code for Japan: **RJ**

2. Enter the operator's 3 letter ICAO identifier as contained in ICAO Doc 8585.
   For International General Aviation, enter "**IGA**".
   For Military Aircraft, enter "**MIL**".
   If none, place an **X** in this field and write the name of the operator/owner in the Remarks row.

3. Enter the ICAO designator as contained in ICAO Doc8643, e.g., for Airbus A320-211, enter A320; for Boeing B747-438 enter B744.

4. Enter series of aircraft type or manufacturer's customer designation, e.g., for Airbus A320-211, enter 211; for Boeing B747-438, enter 400 or 438.

5. Enter ICAO allocated Aircraft Mode S address code (in hexadecimal).
   *This Mode S address code begins with the proper bit string **84, 85, 86, 87** as defined by ICAO for Japanese-registered aircraft.*

6. Example: For July 31, 2008 write 073108.

7. Use a separate sheet of paper if insufficient space available.

When complete, please return to the following address by the next business day:

Civil Aviation Bureau of Japan
Flight Procedures and Airspace Program Office
Air Traffic Control Division, Air Traffic Services Department
Japan Civil Aviation Bureau Regional Monitoring Agency
2-1-3, Kasumigaseki, Chiyoda-ku, Tokyo, 100-8918, JAPAN
Telephone: +81-3-5253-8111 ext.51238
Fax: +81-3-5253-1664
E-Mail: RVSM_report@mlit.go.jp

Contents of the combined RVSM/PBN approvals database currently maintained by Japan RMA.

Basic information	State of Registry	State to which the aircraft is currently registered as defined in ICAO document 7910
	Operator	ICAO code for the current Operator as defined in ICAO document 8585
	State of Operator	State of the current Operator as defined in ICAO document 7910
	Type	Aircraft Type as defined by ICAO document 8643
	Series	Aircraft generic series as described by the aircraft manufacturer
	Ser No	Aircraft Serial Number as given by manufacturer
	Reg. No	Aircraft's current registration mark
	Hex Mode S	Aircraft's current Mode S code 6 hexadecimal digits
	Airworthiness Approved	Yes or no indication of airworthiness approval
	dtAWissued	Date of airworthiness approval
RVSM information	Monitoring	Yes or no indication of RVSM monitoring
	dtMonitoring	Date of RVSM monitoring
	ASE	ASE value (ft)
	Full Approval	Yes or no indication RVSM operational approval
	dtRVSM approval	Date of RVSM approval
	Expired	Yes, if expired day applicable
	dtExpiration	Date of expired if applicable

PBN information	Full Approval RNP10	Yes or no indication RNAV10(RNP10) operational approval
	dtRNP10 approval	Date of RNAV10 (RNP10) approval
	Expired RNP10	Yes, if expired day applicable
	dtExpiration RNP10	Date of expired if applicable
	Full Approval RNAV5	Yes or no indication RNAV 5 operational approval
	dtRNAV5 approval	Date of RNAV5 approval
	Expired RNAV5	Yes, if expired day applicable
	dtExpiration RNAV5	Date of expired if applicable
	Full Approval RNAV1	Yes or no indication RNAV1 and RNAV2 operational approval
	dtRNAV1 approval	Date of RNAV1 and RNAV2 approval
	Expired RNAV1	Yes, if expired day applicable
	dtExpiration RNAV1	Date of expired if applicable
	Full Approval RNP-APCH	Yes or no indication RNP APCH operational approval
	dtRNP-APCH approval	Date of RNP APCH approval
	Expired RNP-APCH	Yes, if expired day applicable
	dtExpiration RNP-APCH	Date of expired if applicable
	Full Approval RNP4	Yes or no indication RNP 4 operational approval
	dtRNP4 approval	Date of RNP4 approval
	Expired RNP4	Yes, if expired day applicable
	dtExpiration RNP4	Date of expired if applicable
Other	OpName	Name of the current Operator
	Remarks	Open comments

Example of the combined RVSM/PBN approvals database currently maintained by Japan RMA.

Basic information

State of Registry	Operator	State of Operator	Type	Series	Ser No	Reg. No	Hex Mode S	Airworthiness Approved	dtAWissued
RJ	ADO	RJ	B735	500	27434	JA300K	850D6B	Y	2008/05/13

RVSM information

Monitoring	dtMonitoring	ASE	Full Approval	dtRVSM approval	Expired	dtExpiration
Y	2008/9/2	-37	Y	2008/05/13		

PBN information

Full Approval RNP10	dtRNP10 approval	Expired RNP10	dtExpiration RNP10	Full Approval RNAV5	dtRNAV5 approval	Expired RNAV5	dtExpiration RNAV5	Full Approval RNAV1	dtRNAV1 approval	Expired RNAV1	dtExpiration RNAV1
				Y	2009/11/2			Y	2009/11/2		

Full Approval RNP-APCH	dtRNP-APCH approval	Expired RNP-APCH	dtExpiration RNP-APCH	Full Approval RNP4	dtRNP4 approval	Expired RNP4	dtExpiration RNP4

Other

OpName	Remarks
Hokkaido International Airlines Co. Ltd.	

Estimated RVSM Monitoring Burden for PARMO

Traffic Flow and Monitoring Source: Australian Area, ADS-B or EGMU					
Responsible State	**Operator**	**MMR Category (1, 2 or 3)**	**Aircraft Monitoring Group**	**Total # Airframes under Monitoring Group**	**Resultant Monitoring Burden (# airframes)**
Fiji	FJI	1	B737C	1	1
		1	B737NX	2	2
		1	B744	2	2
		1	B767	1	1
Total Fiji				**6**	**6**
New Zealand	ANZ	1	A320	12	2
		1	B737CL	15	2
		1	B744	7	2
		1	B767	5	2
		1	B772	8	2
	PBN	1	B737NX	8	2
	IGA	3	CVLT	1	1
	IGA	1	GLF4	1	1
Total New Zealand				**57**	**14**
Vanuatu	AVN	1	B737NX	1	1
Total Vanuatu				**1**	**1**
Total Australian Area, ADS-B/EGMU				**64**	**21**

Traffic Flow and Monitoring Source: Japan Area, HMU					
Responsible State	**Operator**	**MMR Category (1, 2 or 3)**	**Aircraft Monitoring Group**	**Total # Airframes under Monitoring Group**	**Resultant Monitoring Burden (# airframes)**
Republic of Korea	AAR	1	A320	13	2
		1	A330	8	2
		1	B744	12	2
		1	B767	8	2
		1	B772	11	2
	KAL	1	A306	8	2
		1	A330	19	2
		1	B737NX	34	2
		1	B744	44	2
		1	B772	18	2
		1	B773	4	2
	IGA	1	GLF4	1	1
Total Republic of Korea				**180**	**23**
Total Japan Area, HMU				**180**	**23**

Traffic Flow and Monitoring Source: Canada/Mexico/United States, AGHME					
Responsible State	**Operator**	**MMR Category (1, 2 or 3)**	**Aircraft Monitoring Group**	**Total # Airframes under Monitoring Group**	**Resultant Monitoring Burden (# airframes)**
Canada	ACA	1	A320	77	2
		1	A330	8	2
		1	B767	30	2
		1	B772	6	2
		1	B773	12	2
	CJA	1	B737NX	6	2
	SWG	1	B737NX	9	2
	TSC	1	A310	14	2
		1	A330	5	2
	WJA	1	B737C	64	2
		1	B737NX	12	2
	IGA	2	ASTR	1	1
	IGA	1	C56X	1	1
	IGA	1	C680	2	2
	IGA	1	CL600	6	6
	IGA	2	FA50	3	3
	IGA	1	GLEX	1	1
	IGA	1	GLF5	2	2
	IGA	1	LJ45	1	1
Mexico	AMX	1	B737C	27	2
		1	B767	3	2
		1	B772	4	2
	MXA	1	A318	10	2
		1	A320	53	2
	TNO	1	A300	1	1
	VOI	1	A320	19	2
	IGA	1	B737CL	1	1
	IGA	2	BE40	1	1
	IGA	1	C650	2	2
	IGA	1	F900	1	1
	IGA	1	H25B	3	3
	IGA	2	LJ35-36	2	2
	IGA	1	LJ45	3	3
United States	AAL	1	B752	124	2
		1	B767	73	2
		1	B772	47	2
	ABX	1	B767	38	2
	ASA	1	B737C	19	2
		1	B737CL	30	2
		1	B737NX	67	2
	ATN	2	DC86-87	13	8

Responsible State	Operator	MMR Category (1, 2 or 3)	Aircraft Monitoring Group	Total # Airframes under Monitoring Group	Resultant Monitoring Burden (# airframes)
United States	AWE	1	A320	165	2
		1	B737CL	22	2
		1	B752	24	2
		1	B767	10	2
	BSK	1	B737C	1	1
		1	B737NX	7	2
	CKS	1	B744	3	2
		1	B747CL	21	2
	CMI	1	B737NX	9	2
		1	B764	4	2
	COA	1	B737NX	160	2
		1	B752	41	2
		1	B753	21	2
		1	B764	14	2
		1	B767	10	2
		1	B772	20	2
	DAL	1	B737NX	71	2
		1	B744	15	2
		1	B752	168	2
		1	B767	69	2
		1	B772	18	2
	EIA	1	B744	1	1
		2	B744-LCF	1	1
		1	B747CL	9	2
	FDX	1	A310	49	2
		1	B752	36	2
		1	B772	6	2
		1	DC10	66	2
		1	MD11	59	2
	GTI	1	B744	9	2
		1	B747CL	14	2
	HAL	1	B767	18	2
	JUS	2	DC93	7	5
	MGE	1	B727	3	2
	NAC	2	B732	3	2
	NAO	1	B752	5	2
		1	B767	5	2
	NWA	1	A330	11	2
		1	B744	16	2
		1	B747CL	17	2
		1	B752	45	2
		1	B753	16	2

Responsible State	Operator	MMR Category (1, 2 or 3)	Aircraft Monitoring Group	Total # Airframes under Monitoring Group	Resultant Monitoring Burden (# airframes)
United States	OAE	1	B752	3	2
		1	DC10	15	2
	PAC	1	B744	6	2
	RYN	1	B767	6	2
	SOO	1	B747CL	17	2
		1	B747CL	1	1
	UAL	1	A320	152	2
		1	B744	25	2
		1	B752	96	2
		1	B767	35	2
		1	B772	19	2
	UPS	1	B744	12	2
		1	B752	75	2
		1	B767	34	2
		1	MD11	38	2
	WOA	1	B744	2	2
		1	MD11	14	2
	IGA	2	ASTR	3	3
	IGA	1	B737C	5	5
	IGA	1	B737CL	1	1
	IGA	1	B767	4	4
	IGA	1	BD100	7	7
	IGA	2	BD700	1	1
	IGA	2	BE40	2	2
	IGA	2	C25A	3	3
	IGA	2	C25B	11	11
	IGA	2	C500	4	4
	IGA	2	C510	5	5
	IGA	1	C525	5	5
	IGA	2	C550	7	7
	IGA	1	C560	9	9
	IGA	1	C56X	12	12
	IGA	1	C650	1	1
	IGA	1	C680	5	5
	IGA	1	C750	25	25
	IGA	1	CL600	21	21
	IGA	1	CRJ9	1	1
	IGA	1	E135-145	3	3
	IGA	2	F2TH	15	15
	IGA	2	EA50	1	1
	IGA	1	F900	28	28
	IGA	1	FA10	1	1

Responsible State	Operator	MMR Category (1, 2 or 3)	Aircraft Monitoring Group	Total # Airframes under Monitoring Group	Resultant Monitoring Burden (# airframes)
United States	IGA	2	FA20	1	1
	IGA	2	FA50	15	15
	IGA	2	G150	2	2
	IGA	1	GALX	18	18
	IGA	1	GLEX	20	20
	IGA	2	GLF2	4	4
	IGA	2	GLF3	15	15
	IGA	1	GLF4	60	60
	IGA	1	GLF5	57	57
	IGA	1	H25B	8	8
	IGA	2	HA4T	1	1
	IGA	3	LJ24	1	1
	IGA	2	LJ35-36	31	31
	IGA	1	LJ40	1	1
	IGA	1	LJ45	2	2
	IGA	1	LJ60	7	7
	IGA	1	MD80	2	2
	IGA	1	MD83	2	2
	IGA	2	MU30	1	1
	IGA	2	P180	1	1
	IGA	2	WW24	3	3
Total Canada/Mexico/United States				**3052**	**636**
Total Canada/Mexico/United States, AGHME				**3052**	**636**

PARMO Grand Total *(Fiji + New Zealand + Republic of Korea + Vanuatu + Asia/Pacific operations conducted by North America operators (Canada + Mexico + United States)*	**Total # Airframes under Monitoring Group**	**Resultant Monitoring Burden**
	3296	**680**

Note — This letter can be sent to a State authority in an effort to obtain an annual update of RVSM approval data

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(Name of State authority and address) *(Date)*

Subject: RVSM Approval Status for an annual update of States

The *(name of RMA)* has been established by the International Civil Aviation Organization (ICAO) Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) to support the safe use of the reduced vertical separation minimum (RVSM) in *(airspace where the RMA has responsibility)* in accordance with guidance published in ICAO Doc 9574, Annex 6 and Annex 11.

One of the RMA functions is to establish a database of aircraft approved by their respective State authorities for operations in RVSM airspace in the region for which the RMA has responsibility. This information is necessary for two reasons, first the RMA is responsible for verifying the approval status of all aircraft operating within its region and secondly because height keeping performance data must be correlated to an approved airframe. This information is of vital importance if the height-keeping performance data collected by the height monitoring systems is to be effectively utilized in the risk assessment

APANPIRG has determined that in conjunction with the annual December traffic sample data submission and the continuous update of RVSM Approvals data provided to RMAs, States shall provide an annual update of RVSM Approvals data.

This letter is to request that an update of RVSM approvals from the *(State of Registry or Authority, as appropriate)* be provided to the *(name of RMA)*. The minimum data fields to be provided to (*name of RMA*) for each RVSM approved operator/aircraft include the following:

RVSM Approval Data

Field	Description
State of Registry	Nationality identifier as specified in Doc 7910 for current State of Registry.
ICAO Operator designator	ICAO designator for the current Operator as defined in Doc 8585.
State of the Operator	State of the Operator, using the 1 or 2 letter nationality indicator specified in Doc 7910.
ICAO Aircraft Type designator	Aircraft type designator as specified in Doc 8643.
Series	Aircraft generic series as described by the aircraft manufacturer (e.g. 747-100, series = 100).
Serial number	Aircraft serial number as given by manufacturer.
Registration mark	Aircraft's current registration mark.
Mode S	Current Mode S aircraft address (6 hexadecimal digits).
RVSM Airworthiness (MASPS) approved	Yes or no indication of RVSM airworthiness approval.
Date RVSM Airworthiness approved	Date of RVSM airworthiness approval.
RVSM Operational approved	Yes or no indication RVSM operational approval.
Date RVSM Operational approved	Date of RVSM approval.

Date of RVSM Operational approval expiry	Date of expiry of RVSM operational approval.
Method of compliance (service bulletin or STC)	Reference number/name of compliance method used to make the aircraft MASPS compliant.
Remarks	Open comments.
Region(s) for RVSM approval	Name of region(s) where the RVSM approval is applicable. (Only required if RVSM Approval is issued for a specific region(s).)
Operator Name	Name of the current Operator.
Registration Date	Date registration was active for current operator.
State issuing the RVSM approval	State granting RVSM approval, using the 1 or 2 letter nationality indicator specified in Doc 7910.
Date of withdrawal of RVSM Airworthiness (MASPS) approval	Date of withdrawal of the aircraft's RVSM airworthiness approval (if applicable).
Date of withdrawal of RVSM Operational approval	Date of withdraw of the aircraft's RVSM operational approval (if applicable).
Info by Authority	Yes or no indication "Was the information provided to the RMA by a State Authority?"
Civil or military indication *	Aircraft is civil or military.

* Not necessarily a separate field - can be a stand alone field. Military operator/aircraft are indicated as 'MIL' in the ICAO Operator designator except when the military operator has an ICAO code designator.

Please acknowledge receipt of this letter as soon as possible by telephone or email to:

(RMA Contact details)

Thank you for your continued cooperation.

(Sign)

APPENDIX B

LETTER TO STATE AUTHORITY REQUESTING CLARIFICATION OF THE RVSM APPROVAL STATUS OF AN OPERATOR

Note — When the RVSM approval status shown in a filed flight plan cannot be confirmed from an RMA's database of State approvals, a letter similar to the following should be sent to the relevant State authority.

(Name of State authority and address) *(Date)*

Subject: RVSM Approval Status for *(Name of Operator/Aircraft Type and/or Registration Number)*

The *(name of RMA)* has been established by the International Civil Aviation Organization (ICAO) Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) to support the safe use of the reduced vertical separation minimum (RVSM) in *(airspace where the RMA has responsibility)* in accordance with guidance published in ICAO Doc 9574, Annex 6 and Annex 11.

Among other activities, the *(name of RMA)* conducts a comparison of the State RVSM approval status notified by an operator to an air traffic control unit (via filed flight plan) with the records of State RVSM approvals available to us. This comparison is considered vital to ensuring the continued integrity of RVSM operations.

This letter is to advise that an operator for which we believe you are the State of *(Registry or Operator, as appropriate)* provided notice of State RVSM approval which is not confirmed by our records. The details of the occurrence are as follows:

Date:
Operator name:
Aircraft flight identification:
Aircraft type:
Registration mark:
ATC unit receiving notification:

We request that you advise this office of the RVSM approval status of this operator. In the event that you have not granted RVSM approval to this operator, we request that you advise this office of any action which you propose to take.

Please acknowledge receipt of this letter as soon as possible by telephone or email to:

(RMA Contact details)

Thank you for your continued cooperation.

(Sign)

APPENDIX C

LETTER TO STATE AUTHORITY REQUESTING RVSM APPROVAL INFORMATION

Note — This letter can be sent to a State authority in an effort to obtain current RVSM approval information on more than one operator/aircraft type

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(Name of State authority and address) *(Date)*

Subject: RVSM Approval Status for *(Name of Operator(s)/Aircraft Type(s))*

The *(name of RMA)* has been established by the International Civil Aviation Organization (ICAO) Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) to support the safe use of the reduced vertical separation minimum (RVSM) in *(airspace where the RMA has responsibility)* in accordance with guidance published in ICAO Doc 9574, Annex 6 and Annex 11.

Among other activities, the *(name of RMA)* conducts a comparison of the State RVSM approval status notified by an operator to an air traffic control unit (via filed flight plan) with the records of State RVSM approvals available to us. This comparison is considered vital to ensuring the continued integrity of RVSM operations.

This letter is to advise that *(an)* operator*(s)* for which we believe you are the State of *(Registry or Authority, as appropriate)* provided notice of State RVSM approval which is not confirmed by our records. The details of the occurrence*(s)* are as follows:

Date*(s)*:
Operator name:
Aircraft type:
Registration mark:
ATC unit*(s)* receiving notification:
(REPEAT ABOVE AS NECESSARY)

We request that you advise this office of the RVSM approval status of *(this/these)* operator*(s)*. In the event that you have not granted RVSM approval to *(this/these)* operator*(s)*, we request that you advise this office of any action which you propose to take.

Please acknowledge receipt of this letter as soon as possible by telephone or email to:

(RMA Contact details)

Thank you for your continued cooperation.

(Sign)

APPENDIX D

INDIVIDUAL AIRFRAME ASSESSED AS NON-COMPLIANT WITH ALTIMETRY SYSTEM ERROR (ASE) PERFORMANCE REQUIREMENTS

Sample letter to an operator and State authority of an aircraft observed to have exhibited an ASE in excess of 245 ft in magnitude

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(Name and address of Operator) *(Date)*

Subject: RVSM Height-Keeping Performance Monitoring Result for *(Registration Number), (Aircraft Type)*

The *(name of RMA)* provides Regional Monitoring Agency (RMA) services for the International Civil Aviation Organization (ICAO) Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) in support of the continued safe use of the Reduced Vertical Separation Minimum (RVSM) in *(name or description of airspace)*.

Guidance material relating to vertical separation and monitoring of height-keeping performance is contained in the Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum between FL 290 and FL 410 Inclusive (ICAO Doc 9574). Aircraft operators, air traffic service providers and ICAO States are required to comply with the ICAO Annex provisions – including Annex 6 and Annex 11 in regard to safety monitoring.

On *(date)* a flight, aircraft registration *(insert aircraft registration),* Modes S aircraft address *(insert Mode S address)*, which we believe to be operated by you and identified as being RVSM Minimum Aircraft System Performance Specification (MASPS) compliant by *(operator/State)*, was monitored by the *(Monitoring unit)* and an altimetry system error (ASE) of *(value)* was observed.

For a detailed explanation on the height-keeping requirements you may wish to refer to *(ICAO Annex 6, Appendix 4 or ICAO Doc 9574, paragraph 4.7).*

This measurement indicates that the aircraft **may not be** compliant with the height keeping accuracy requirements for RVSM airspace. It is therefore requested that an immediate investigation be undertaken into this discrepancy and that the necessary arrangements be made for a repeat measurement at the earliest opportunity, following any rectification or inspection of the altimetry system.

The findings of your investigation should be summarized in the enclosed "Height-Keeping Error Investigation Form" and returned to *(name of RMA)* at the address given.

Please acknowledge receipt of this letter as soon as possible by telephone or email to:

(RMA Contact details)

Thank you for your continued cooperation.

(Sign)

CC: *(State authority issuing RVSM approval for this operator/aircraft)*

HEIGHT-KEEPING ERROR INVESTIGATION FORM

Part 1 — General information

State of Registry	
Operator	
State of the Operator	
Aircraft type and series	
Registration mark	
Serial number	
Mode S aircraft address	

Part 2 — Details of height-keeping error

A shaded box with bold figures indicates an excess of the ICAO Doc 9574 and ICAO Annex 6 requirements (taking into account measurement error).

Date and time of measurement	Assigned flight level	Altimetry system error (feet)	Assigned altitude deviation (feet)	Total vertical error (feet)

Provide details below of the fault found (if any) plus date and nature of the rectification work. Please also include an estimate of the number of flights the aircraft has performed in RVSM airspace between the date of measurement and rectification.

When complete, please return to:

(RMA Contact details)

Appendix J

CPDLC/ADS-C Data Link Performance Monitoring

Presented to: RASMAG/13

By: Christine Falk, FAA Technical Center

Date: 2-5 August, 201022-26 March 2010

Federal Aviation Administration

Purpose

- **Provide observed performance from the operational data link system at New York Oceanic Center**
- **Performance is measured against the RCP 240 and RSP 180 specifications to demonstrate that safety objectives which rely on the communications infrastructure can be met by the aircraft and ground systems**

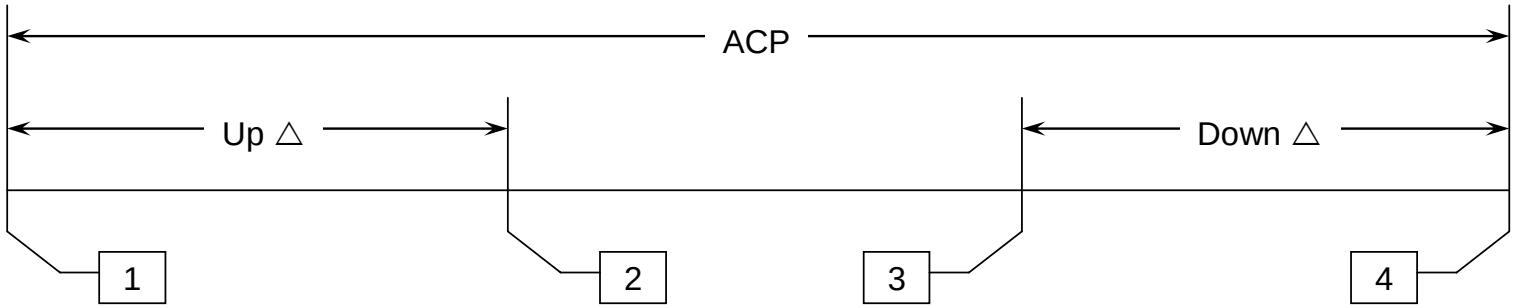
Data Link Messages

- **CPDLC**
  - Transit and response times to CPDLC uplinks that receive a single WILCO and/or an Unable response
  - Include communications transfer messages in addition to the typical intervention messages such as climb clearances
  - These messages are considered to be intervention messages critical to the communications used when applying reduced separation standards
  - All messages with a WILCO and/or Unable response attribute are assessed

CPDLC Performance Measures

- **Actual Communication Performance (ACP)**
  - Total time required by the communication transaction
  - Begins at the time the CPDLC is sent to aircraft
  - Ends at the time the WILCO/Unable is received
- **Actual Communication Technical Performance (ACTP)**
  - Time required for the message delivery, includes:
    - CPDLC clearance uplink transit time
    - WILCO/Unable downlink transit time
- **Pilot Operational Response Time (PORT)**
  - Time required for crew response
  - Estimated as ACP - ACTP

CPDLC Performance Measures



1. Uplink Sent. This is the date/time that the CPDLC clearance was sent to the aircraft.
2. MAS Received. This is the date/time that the MAS for the CPDLC clearance was received.
3. WILCO/UNABLE Sent. This is the date/time that the WILCO or UNABLE reply is transmitted.
4. WILCO/UNABLE Received. This is the date/time that the WILCO or UNABLE reply for the CPDLC clearance was received.

The measurements (in seconds) are calculated as follows:

$$ACP = (WILCO_UNABLE_Received) - (Uplink_Sent)$$ → **TRN**

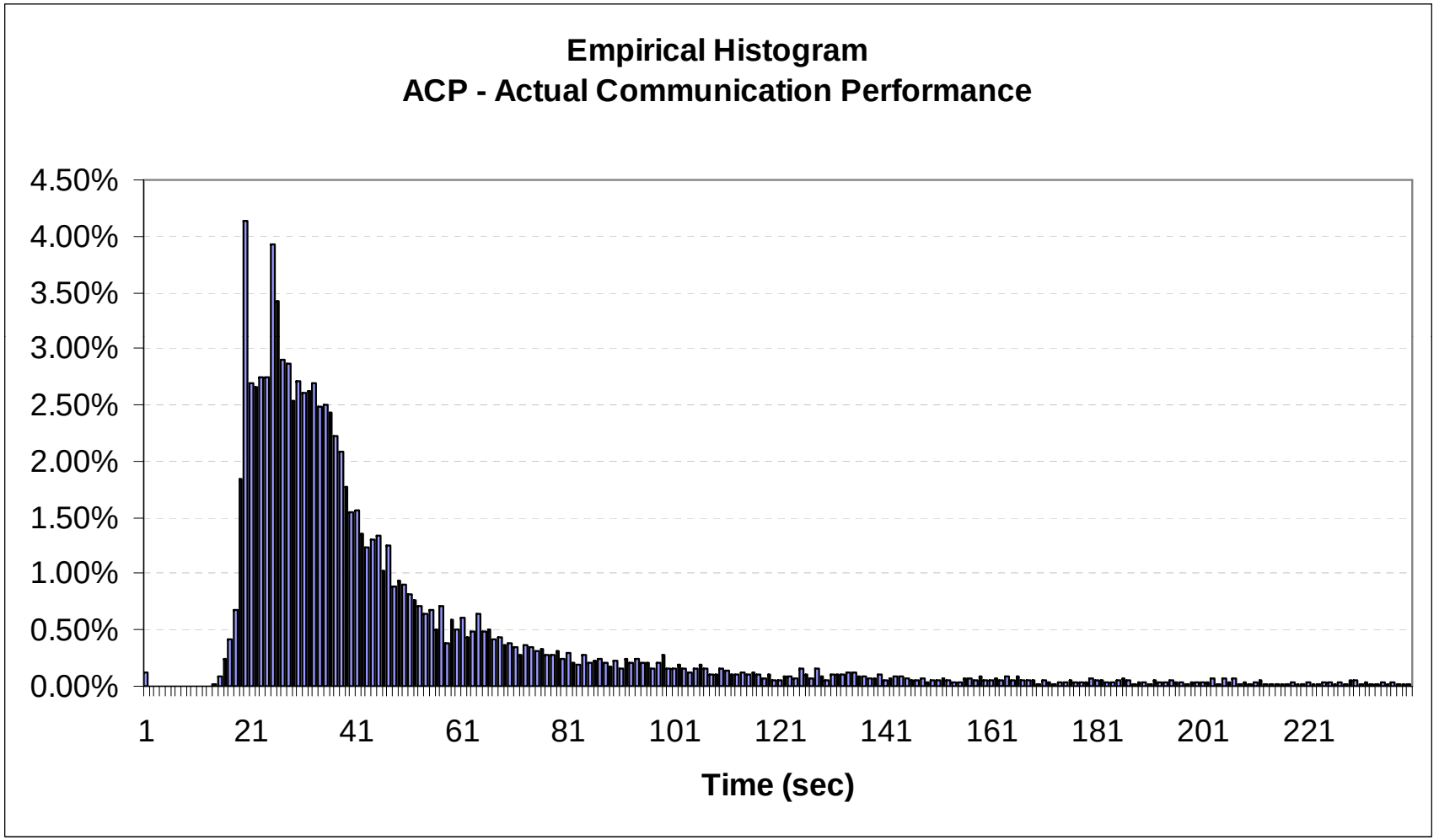
$$ACTP \cong \left(\left(\frac{Up\Delta}{2}\right) + (Down\Delta)\right)$$ → **RCTP**

$$PORT \cong ACP - ACTP$$ → **Responder**

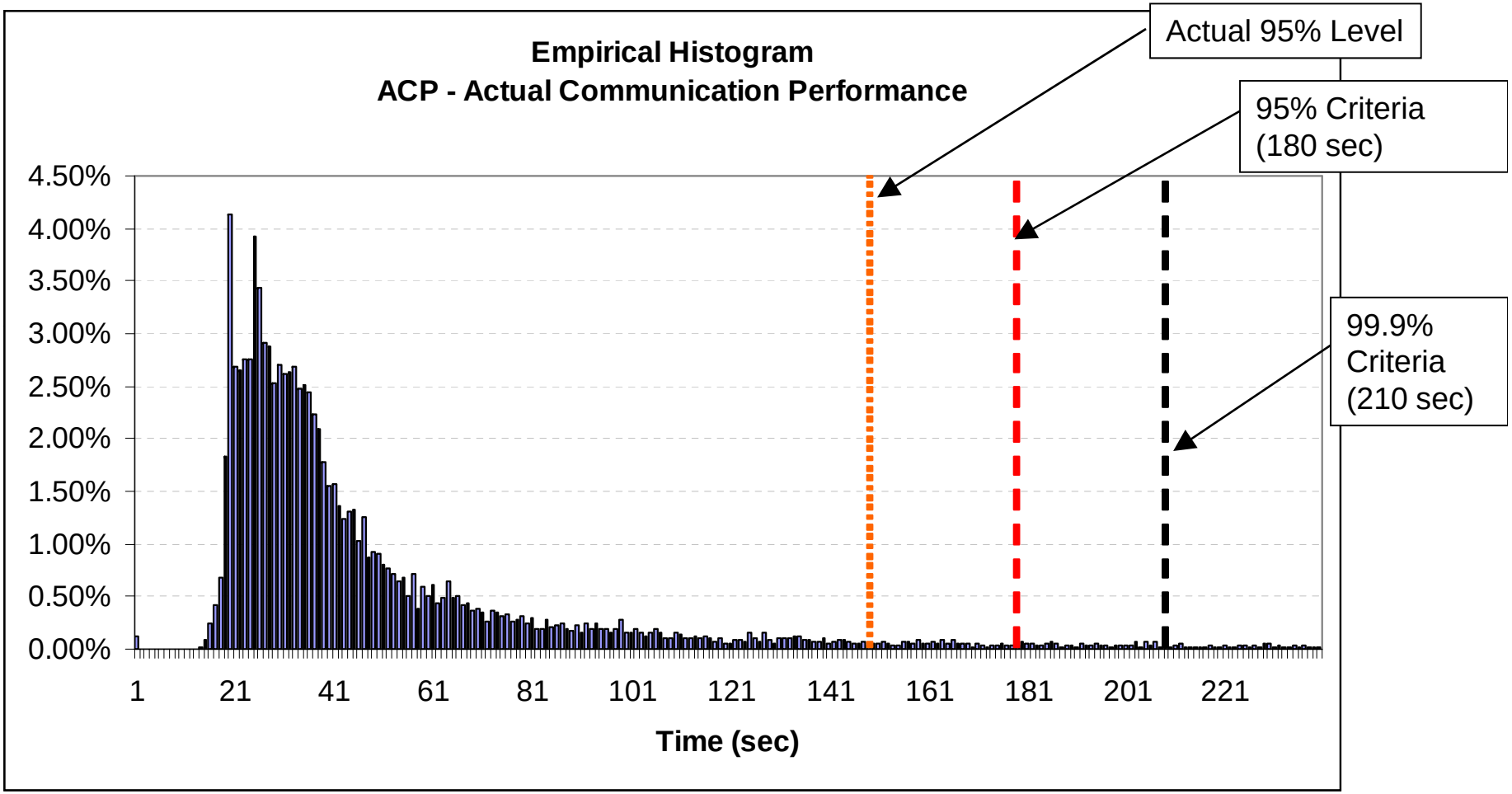
Data Link Messages

- **Surveillance Latency**
  - ADS-C
    - Time for downlink message delivery
    - Begins with aircraft provided sent time
    - Ends with ATC receipt time

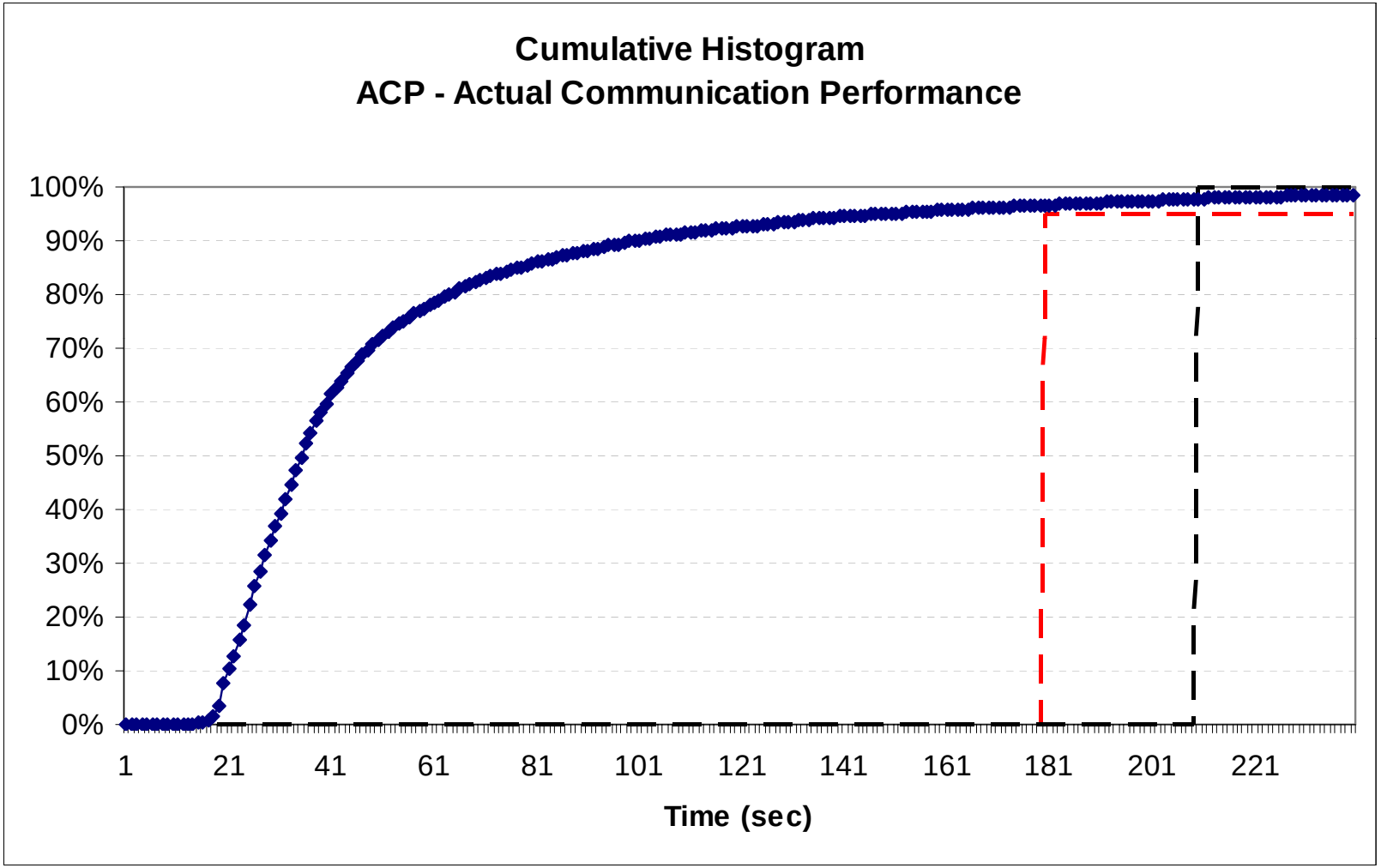
Reading GOLD Charts



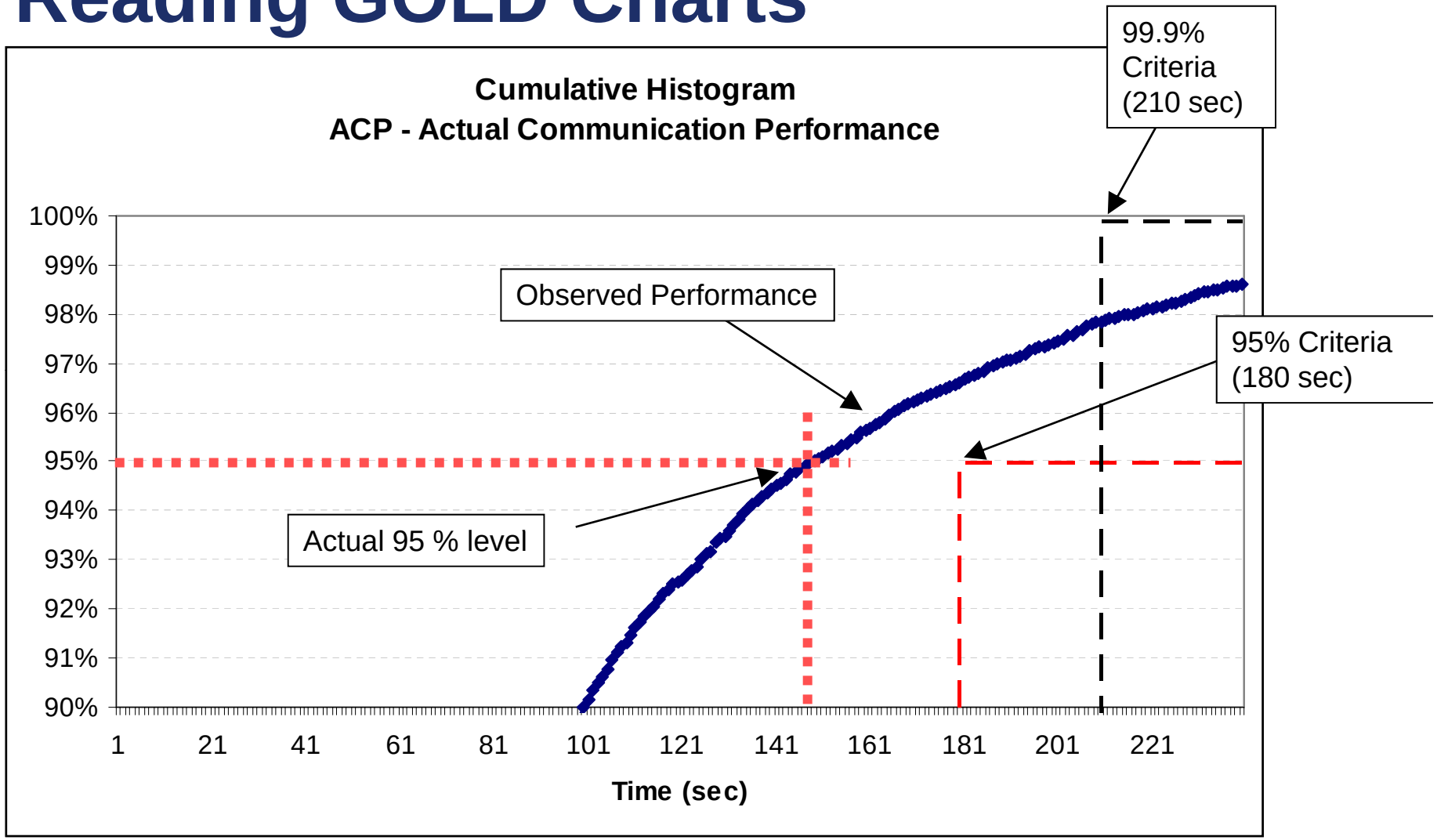
Reading GOLD Charts



Reading GOLD Charts



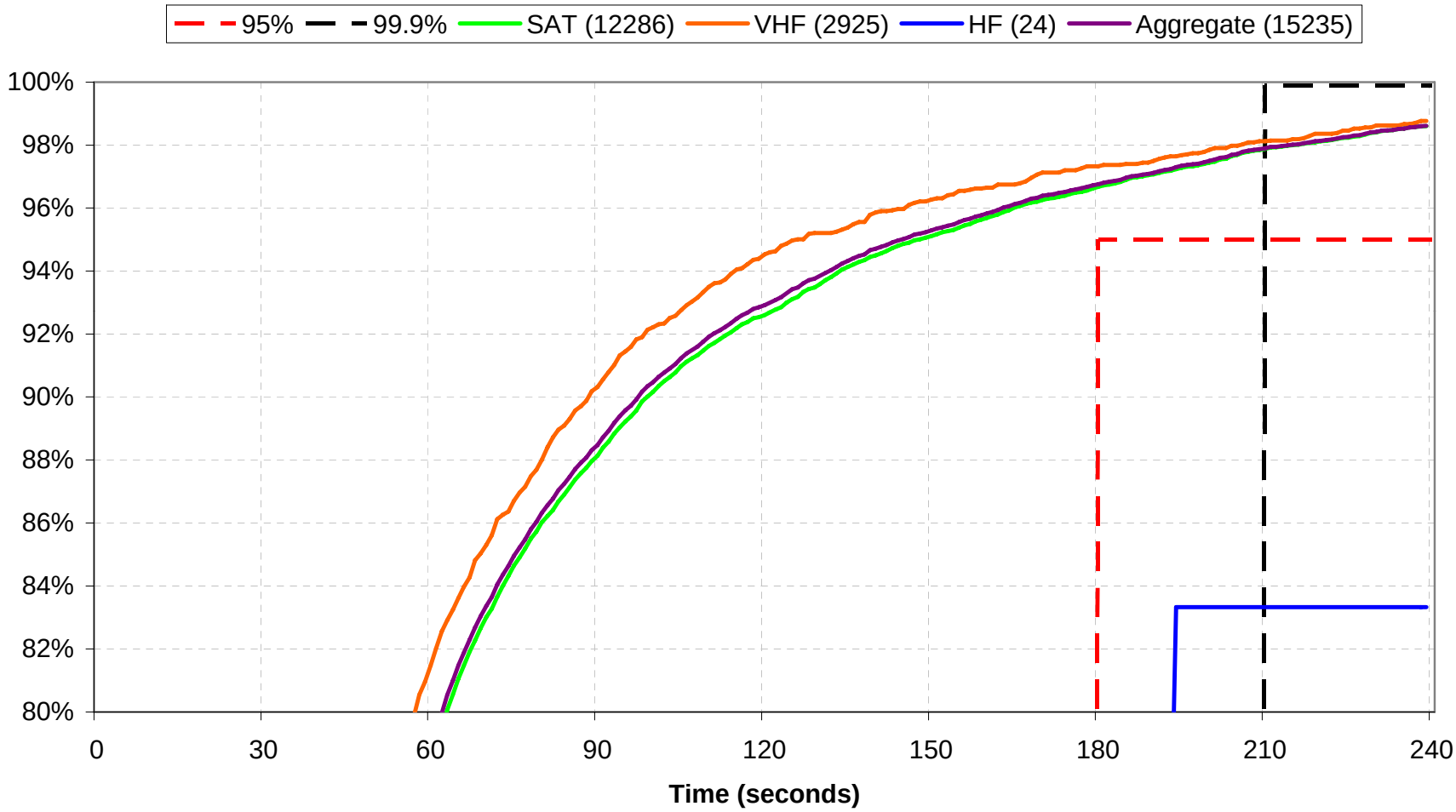
Reading GOLD Charts



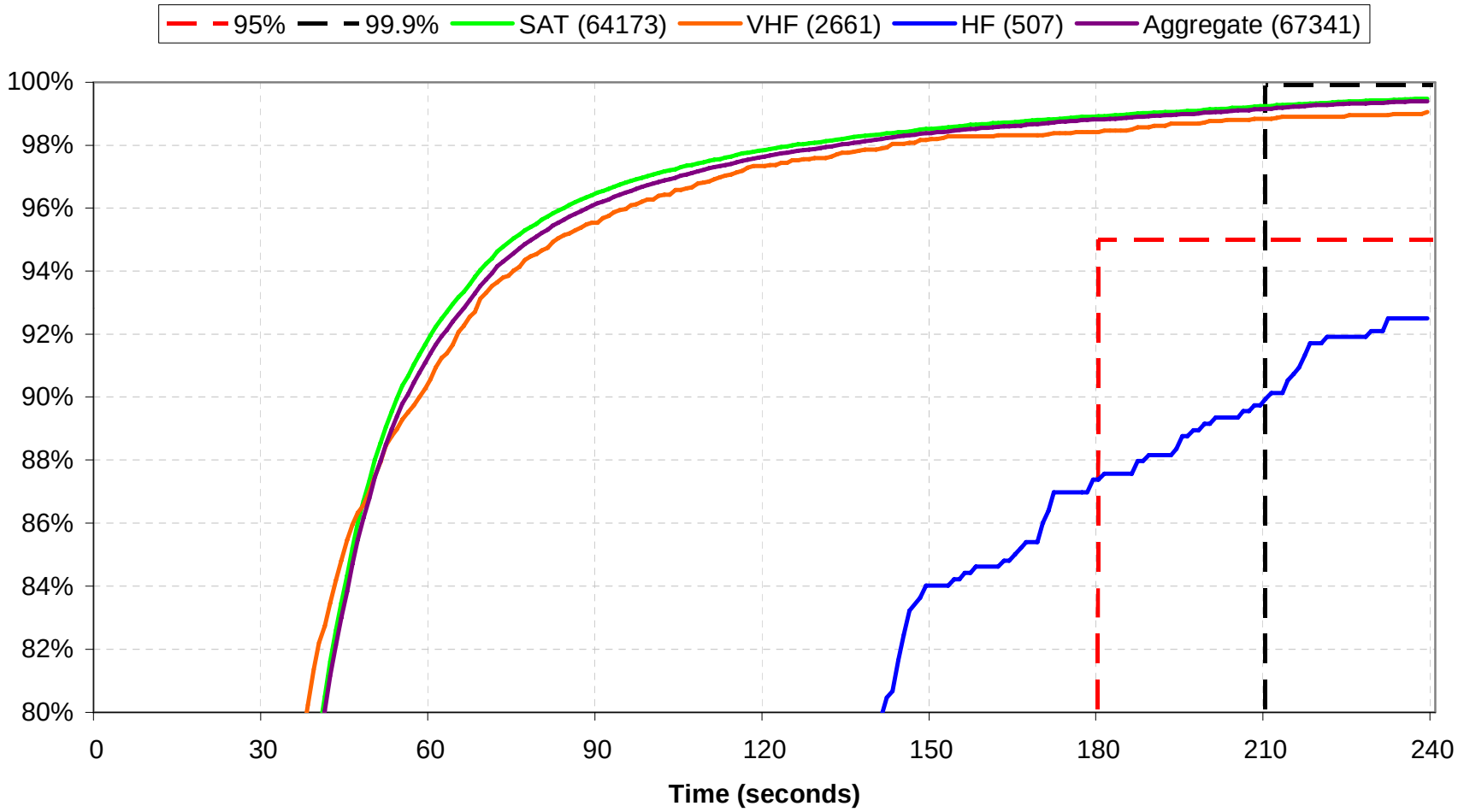
Performance by Media Type

- **ACP, ACTP, and ADS-C**
  - New York and Oakland data
  - SATCOM, VHF, and HF datalink

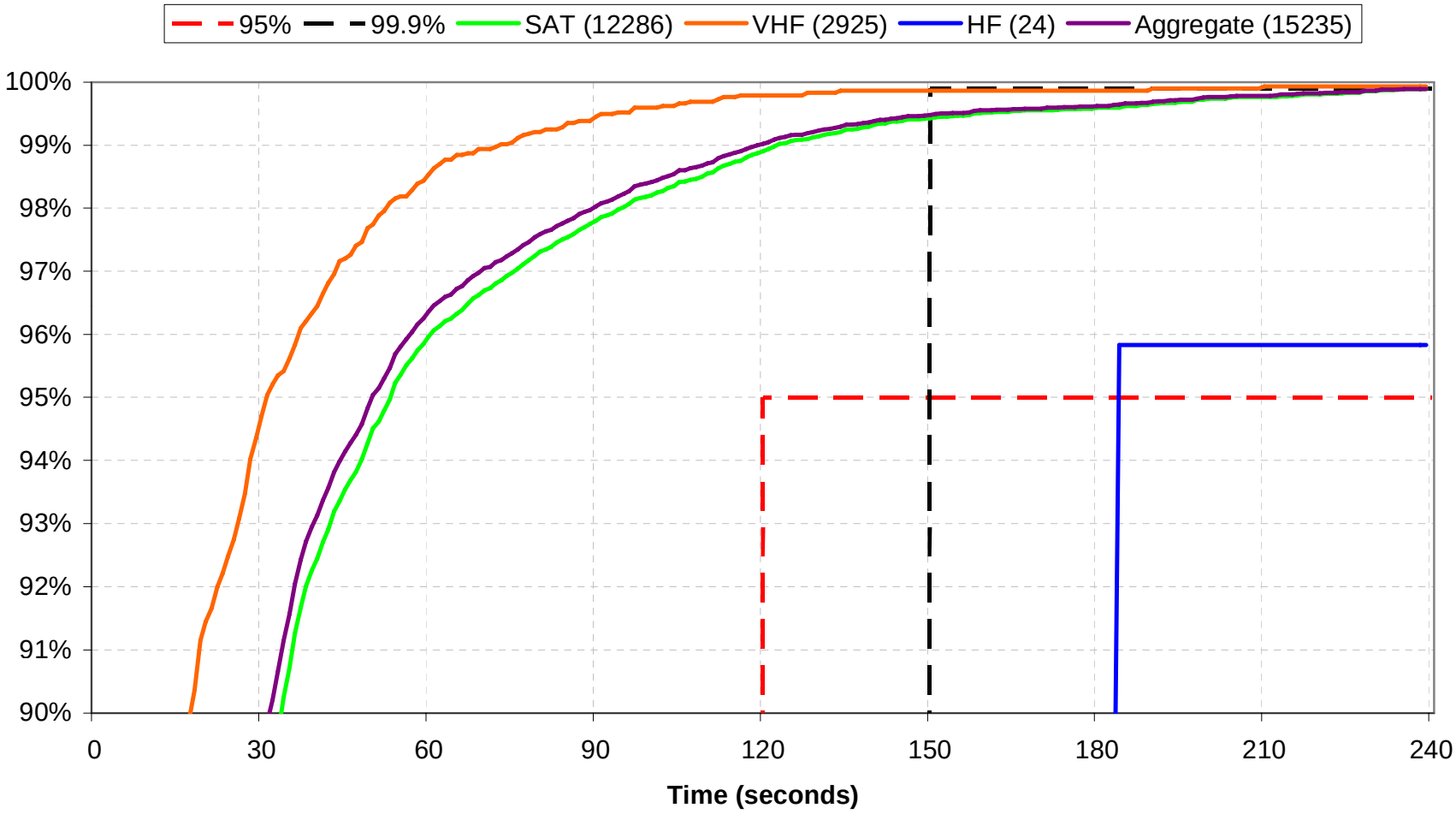
New York FIR All RGS
CPDLC Actual Communication Performance (TRN)
(Reported DSP Outages Excluded)



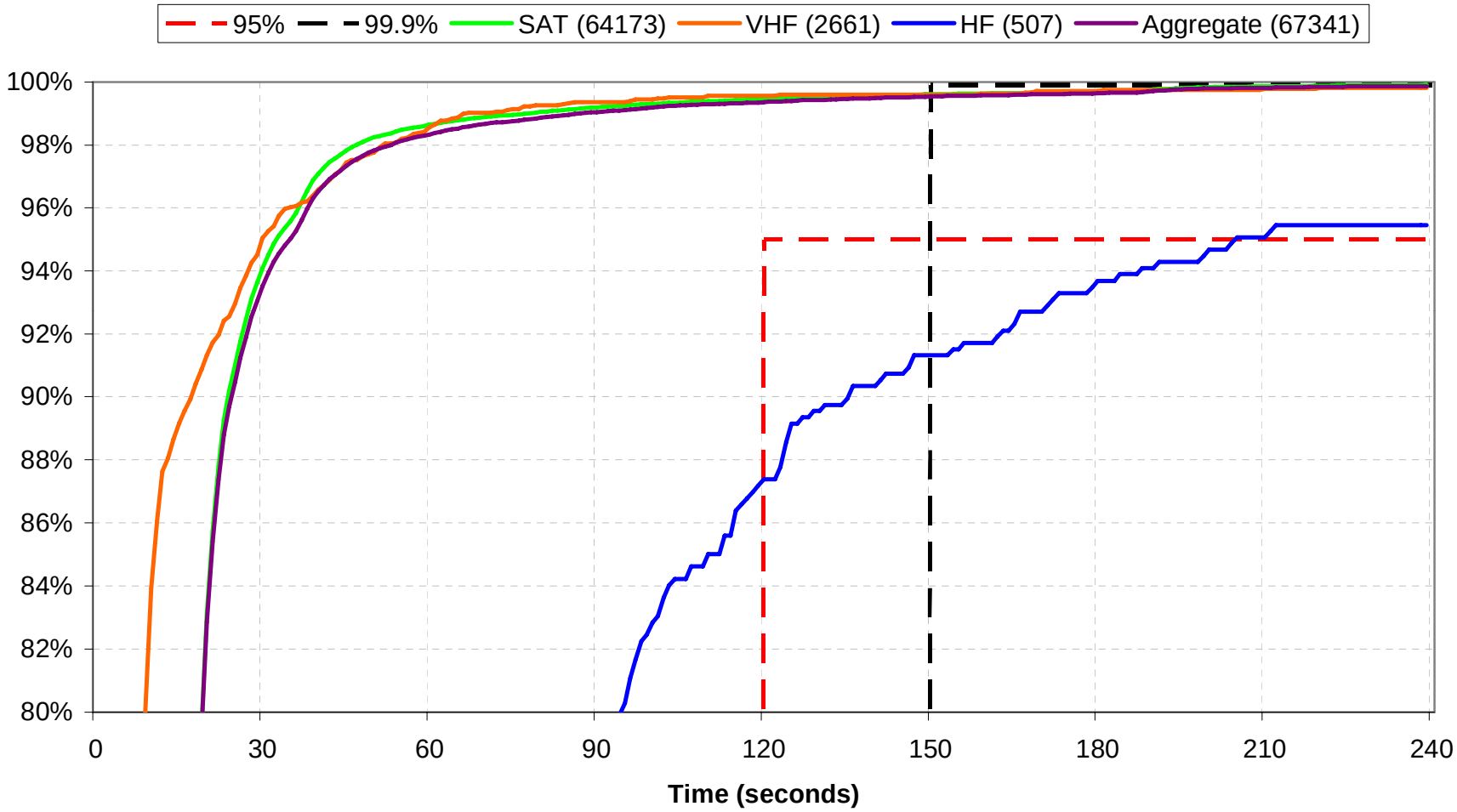
Oakland FIR All RGS
CPDLC Actual Communication Performance (TRN)
(Reported DSP Outages Excluded)



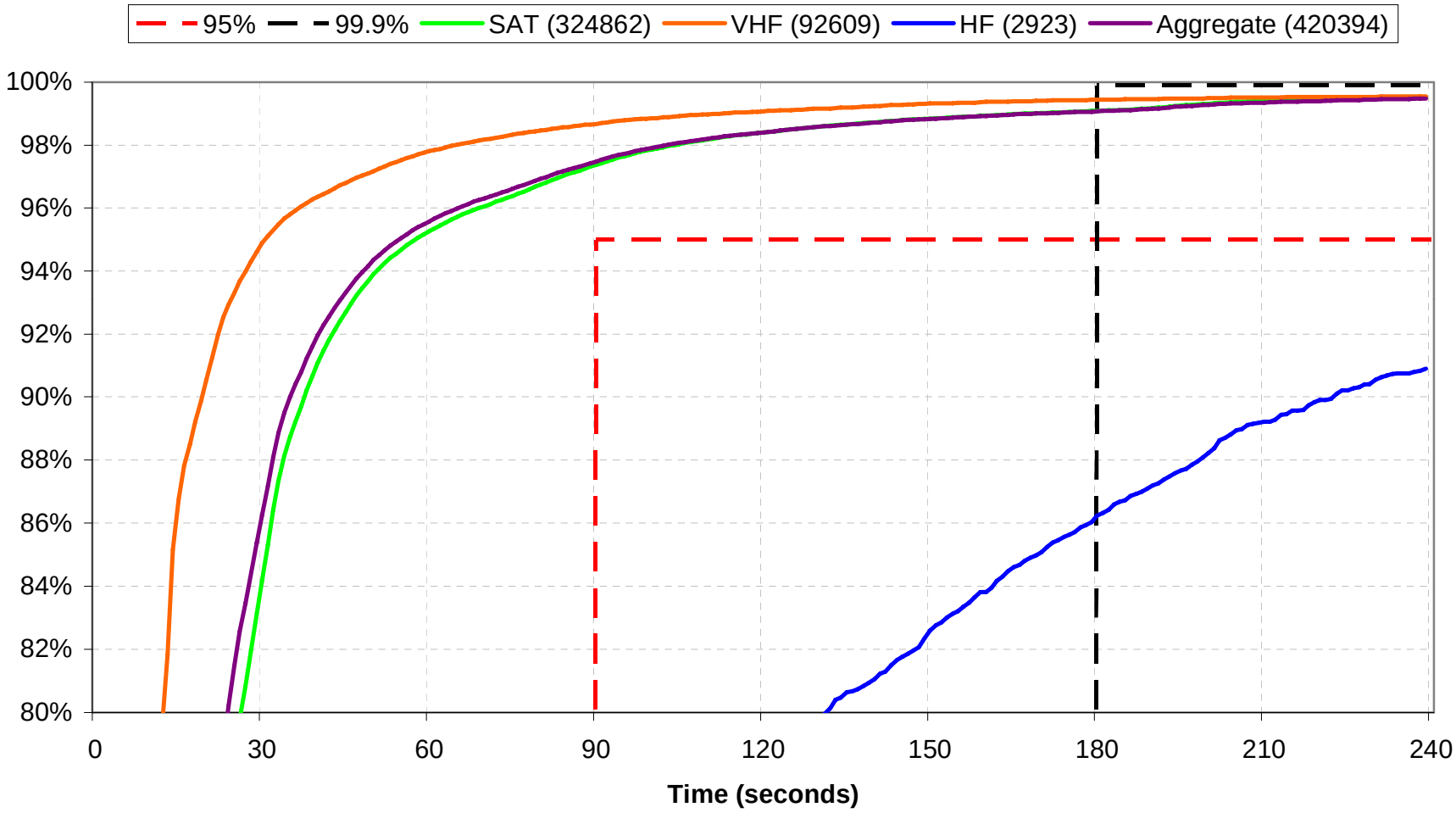
New York FIR All RGS
CPDLC Actual Communication Technical Performance (ACTP)
(Reported DSP Outages Excluded)



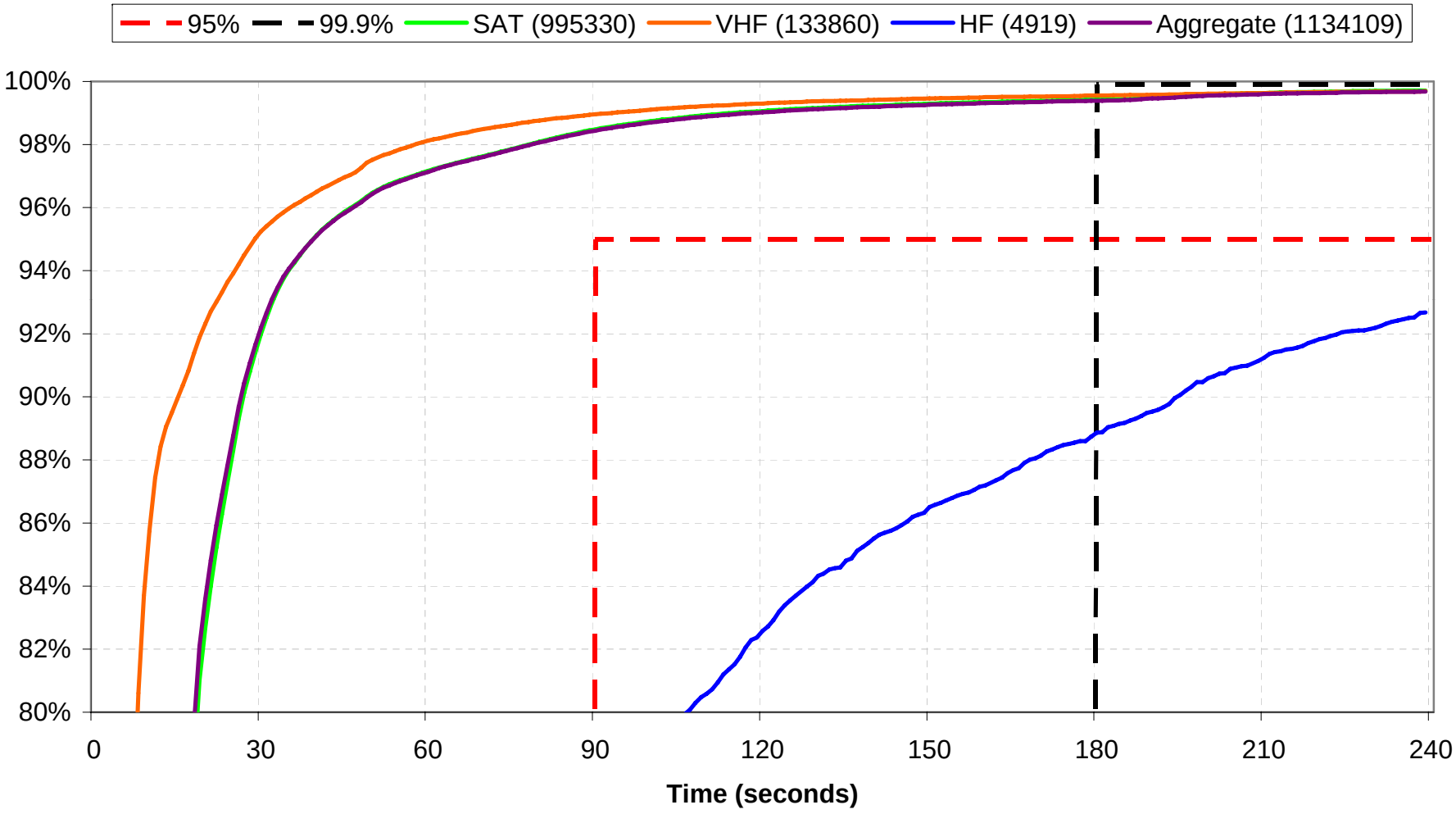
Oakland FIR All RGS
CPDLC Actual Communication Technical Performance (ACTP)
(Reported DSP Outages Excluded)



New York FIR All RGS
ADS-C Downlink Latency
(Reported DSP Outages Excluded)



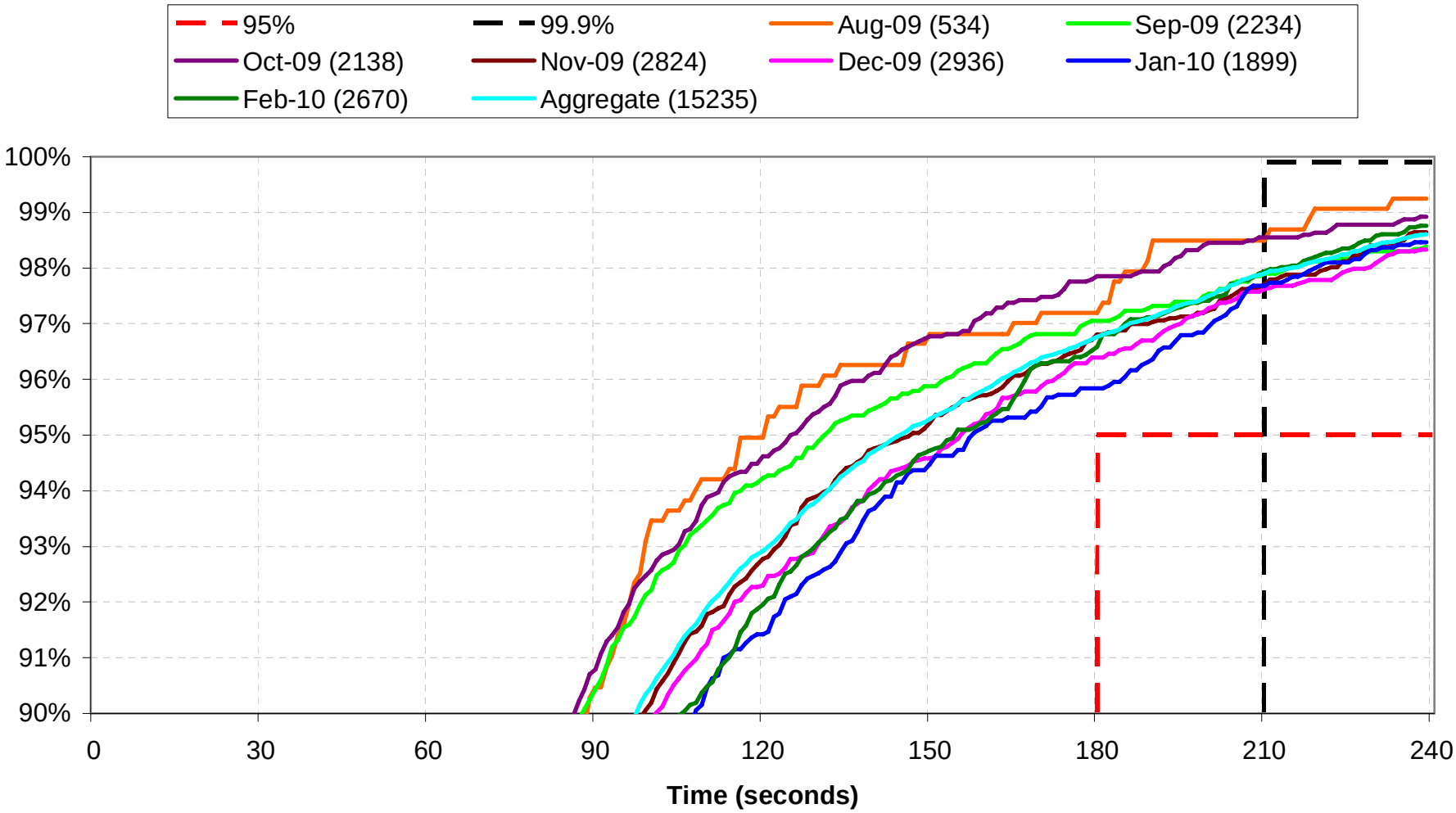
Oakland FIR All RGS
ADS-C Downlink Latency
(Reported DSP Outages Excluded)



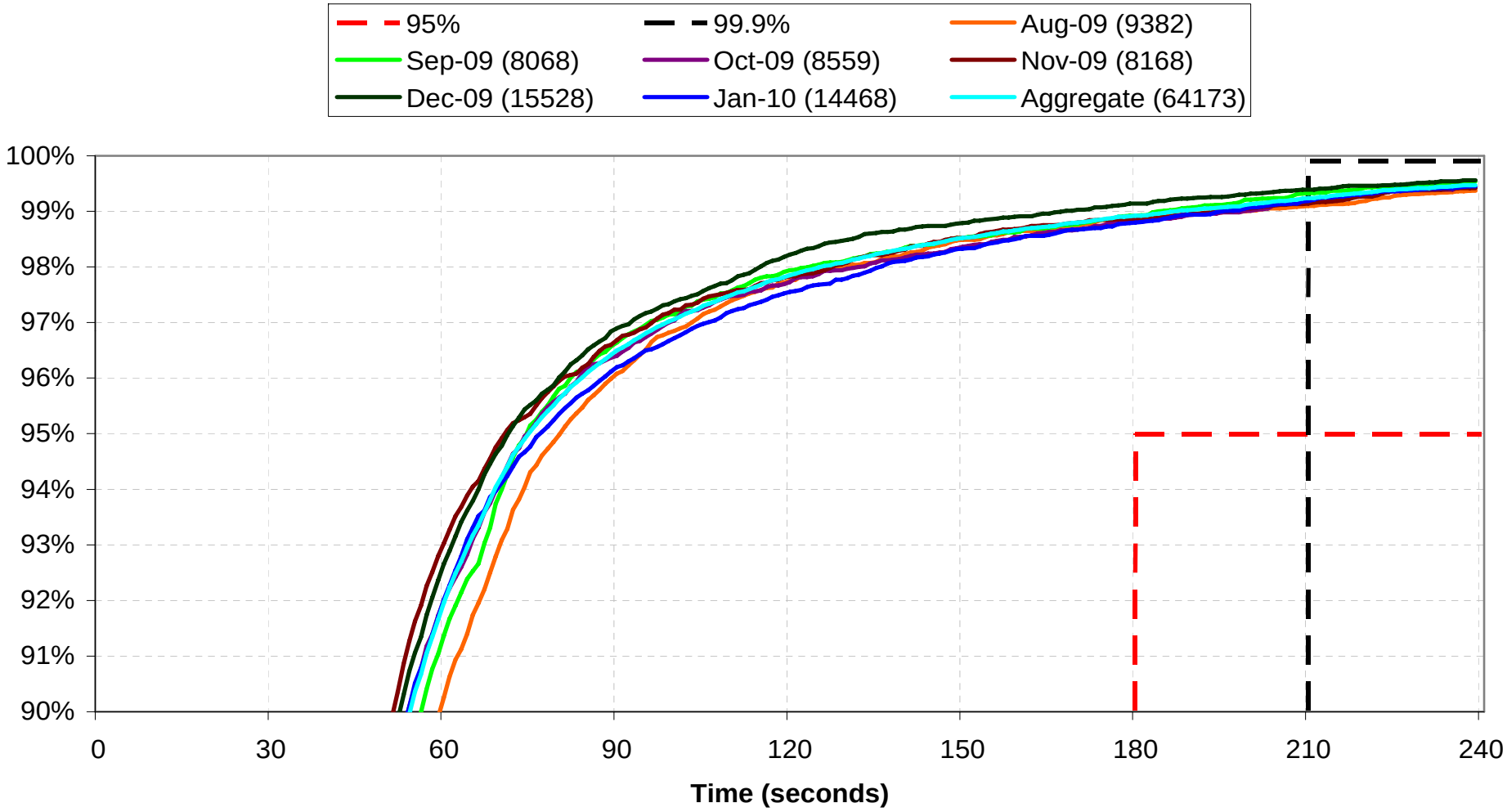
Performance by Month

- **ACP, ACTP, and ADS-C performance for the New York and Oakland FIRs**
  - Includes all data link media types

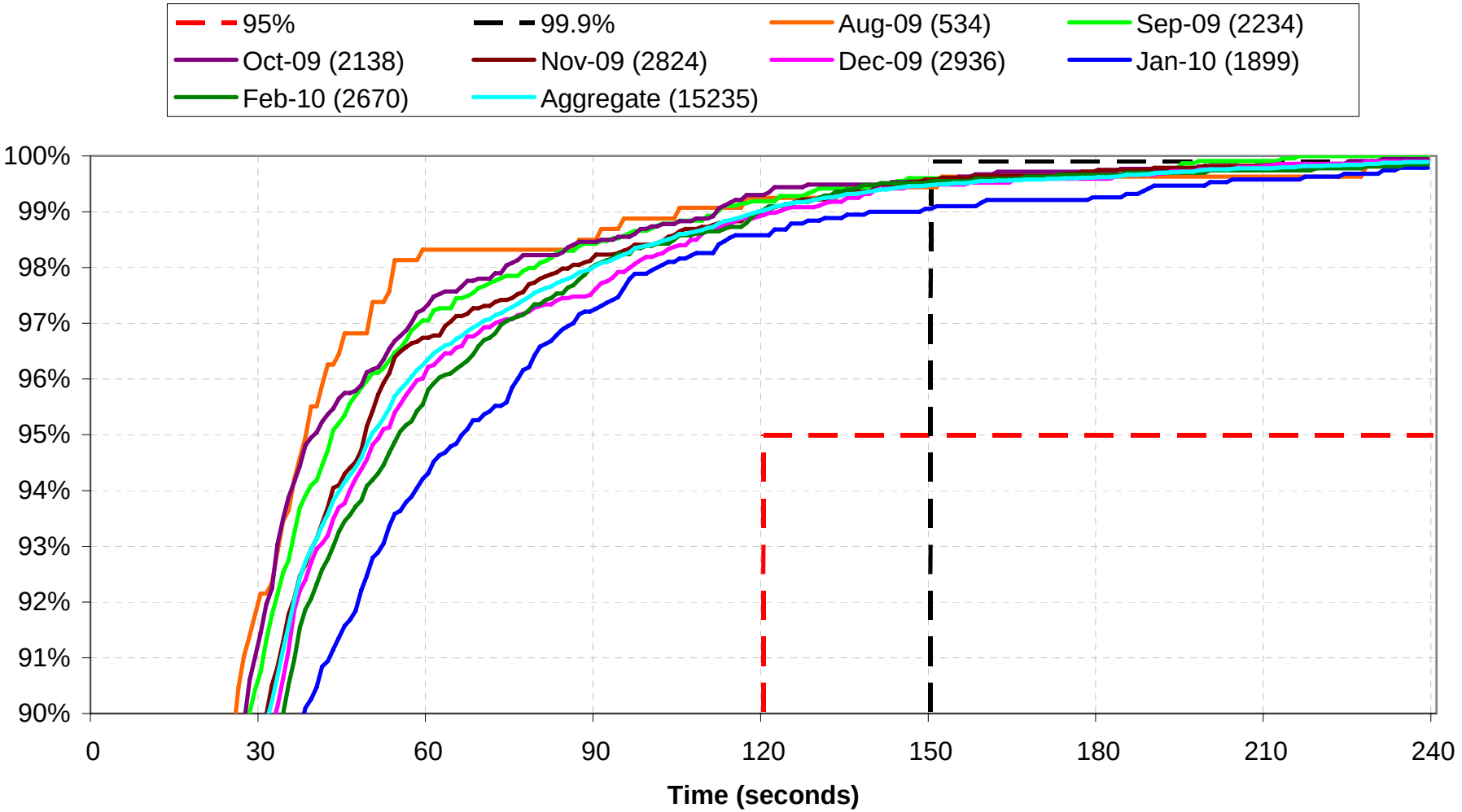
New York FIR All RGS
CPDLC Actual Communication Performance (TRN)
(Reported DSP Outages Excluded)



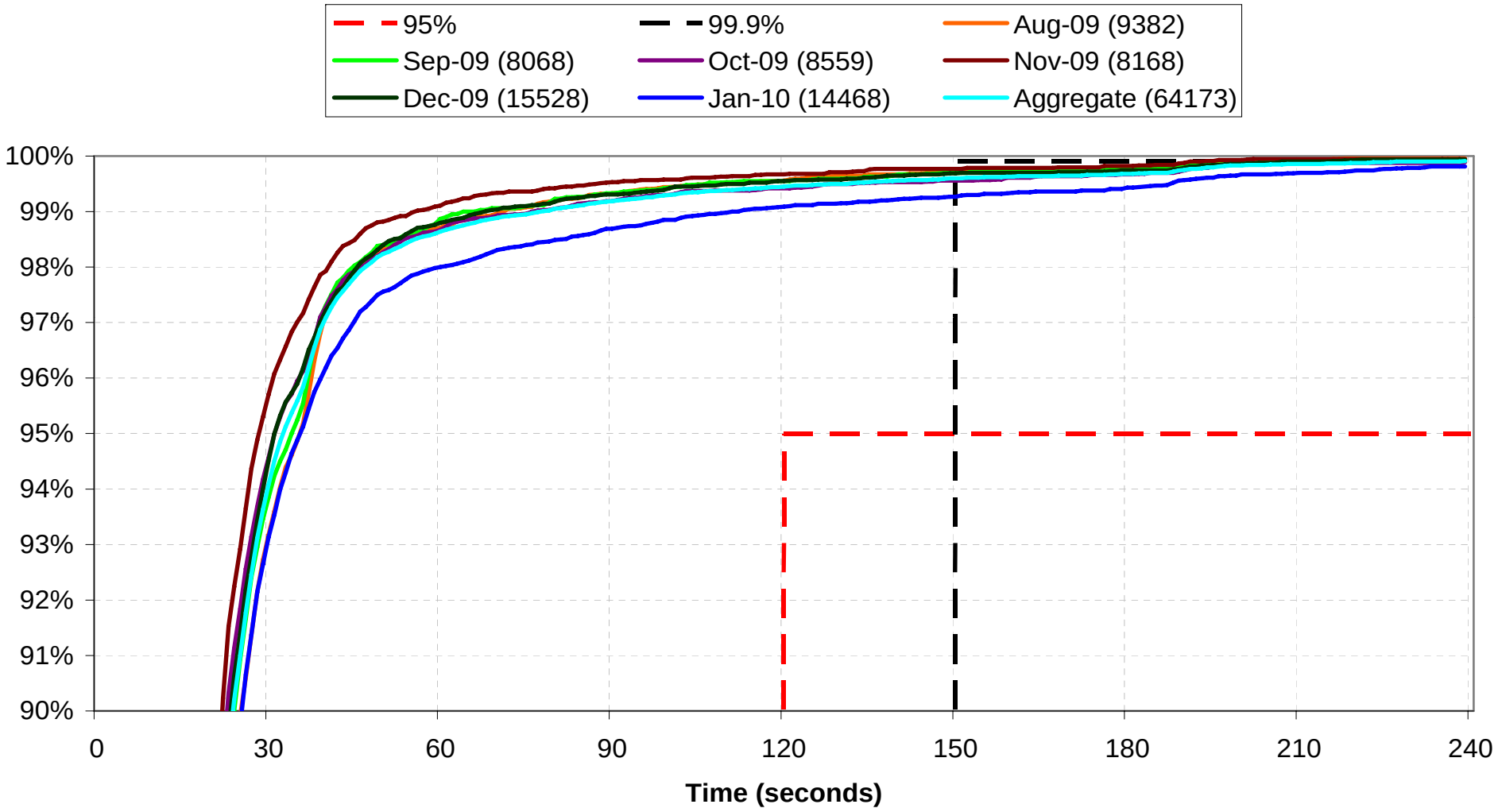
Oakland FIR SAT RGS
CPDLC Actual Communication Performance (TRN)
(Reported DSP Outages Excluded)



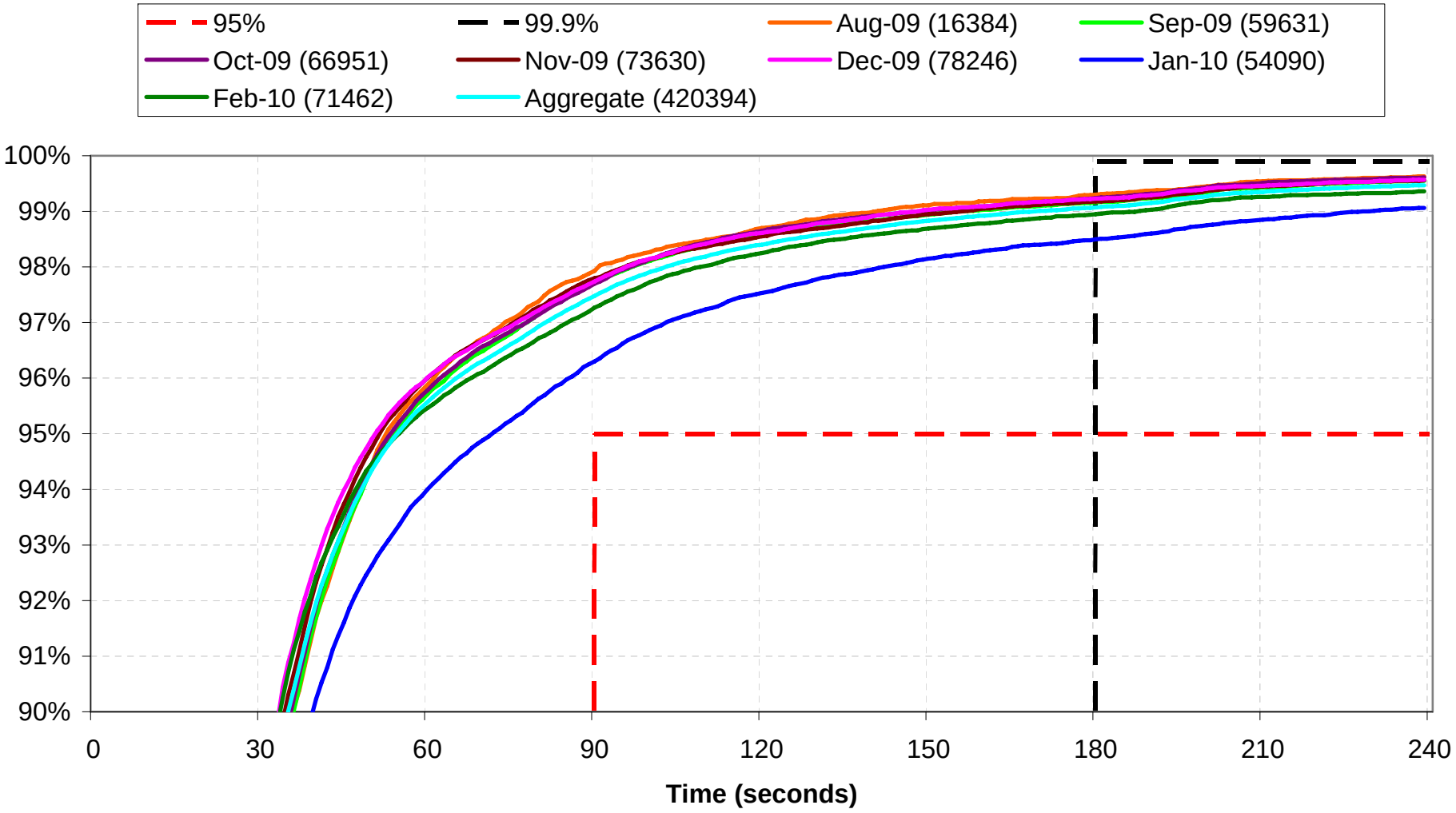
New York FIR All RGS
CPDLC Actual Communication Technical Performance (ACTP)
(Reported DSP Outages Excluded)



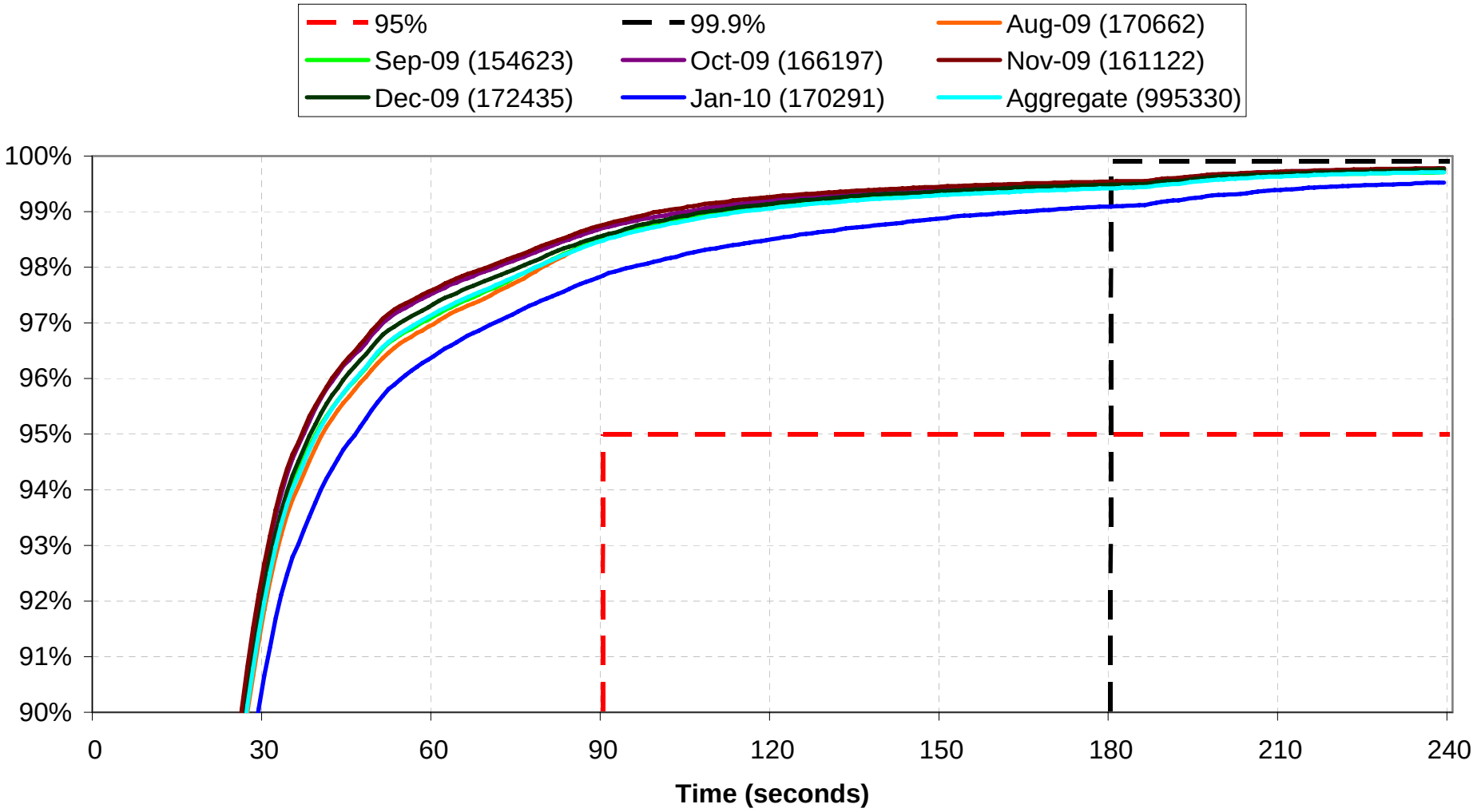
Oakland FIR SAT RGS
CPDLC Actual Communication Technical Performance (ACTP)
(Reported DSP Outages Excluded)



New York FIR All RGS
ADS-C Downlink Latency
(Reported DSP Outages Excluded)



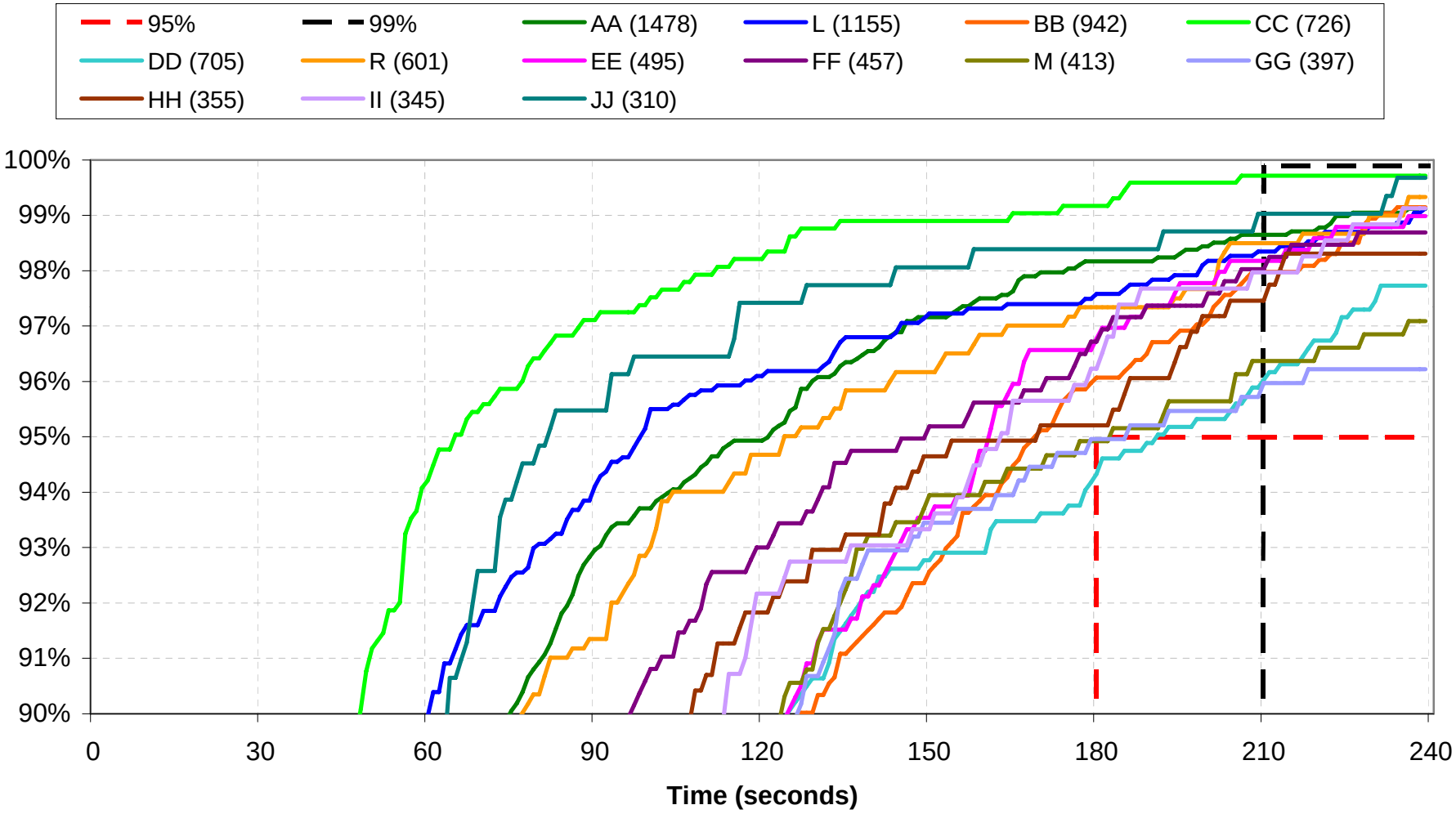
Oakland FIR SAT RGS
ADS-C Downlink Latency
(Reported DSP Outages Excluded)



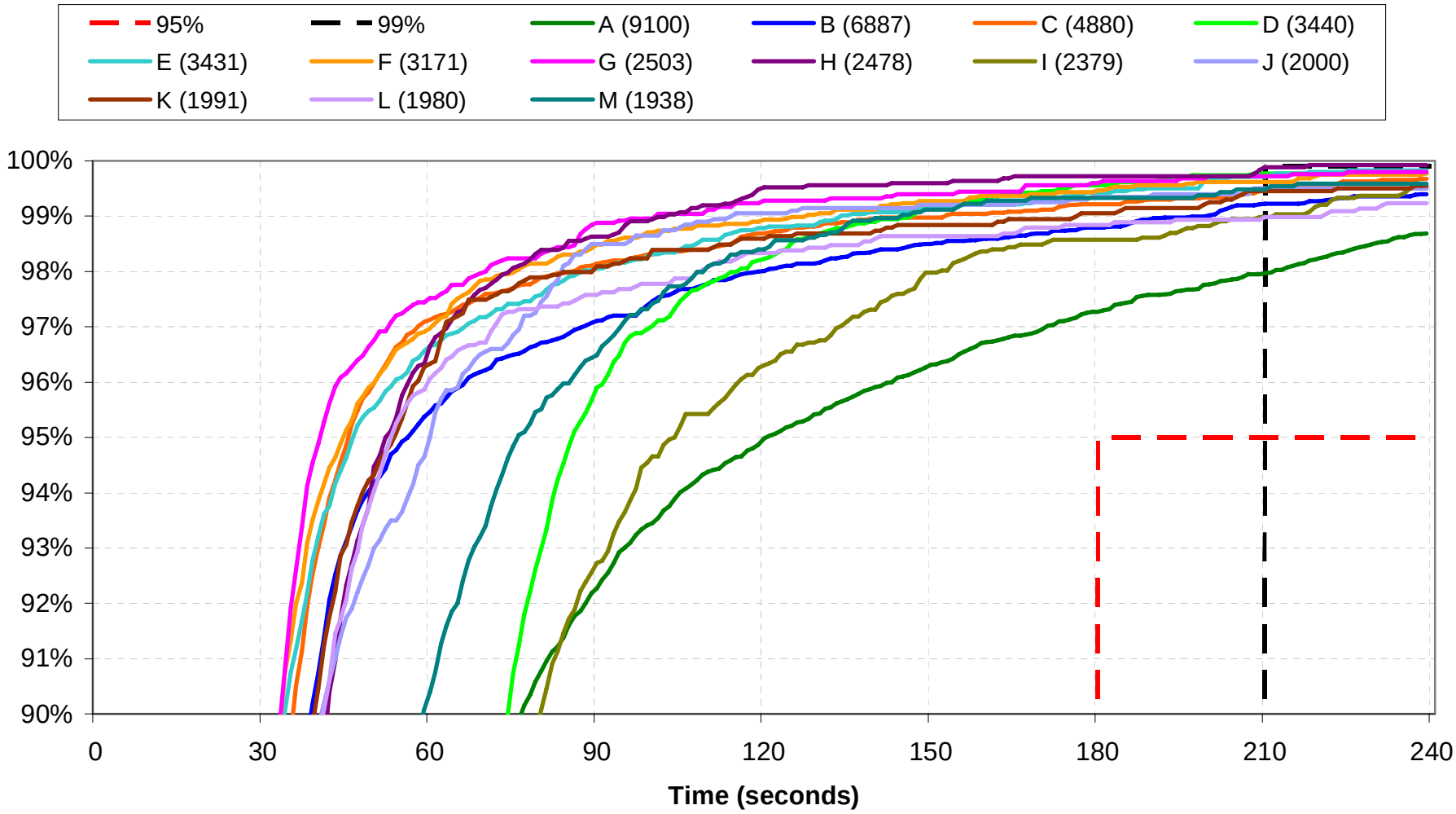
Performance by Operator

- **Top 13 operators in terms of message counts compared**
- **ACP, ACTP, PORT, and ADS-C charts for SATCOM data link only**
- **Data from New York and Oakland FIRs**
- **Operator information is desensitized**

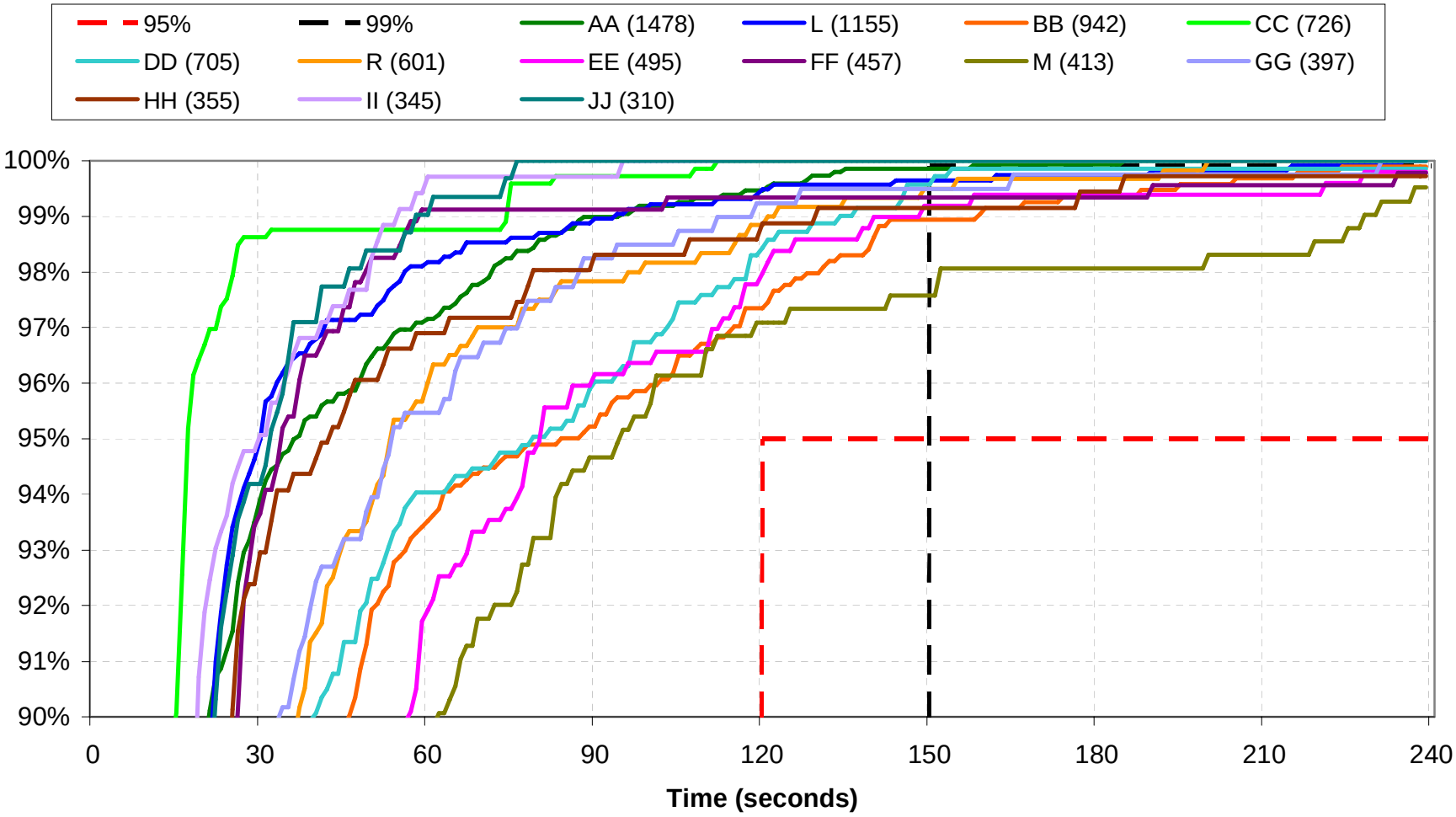
New York FIR SAT RGS-By Operator
CPDLC Actual Communication Performance (TRN)
(Reported DSP Outages Excluded)



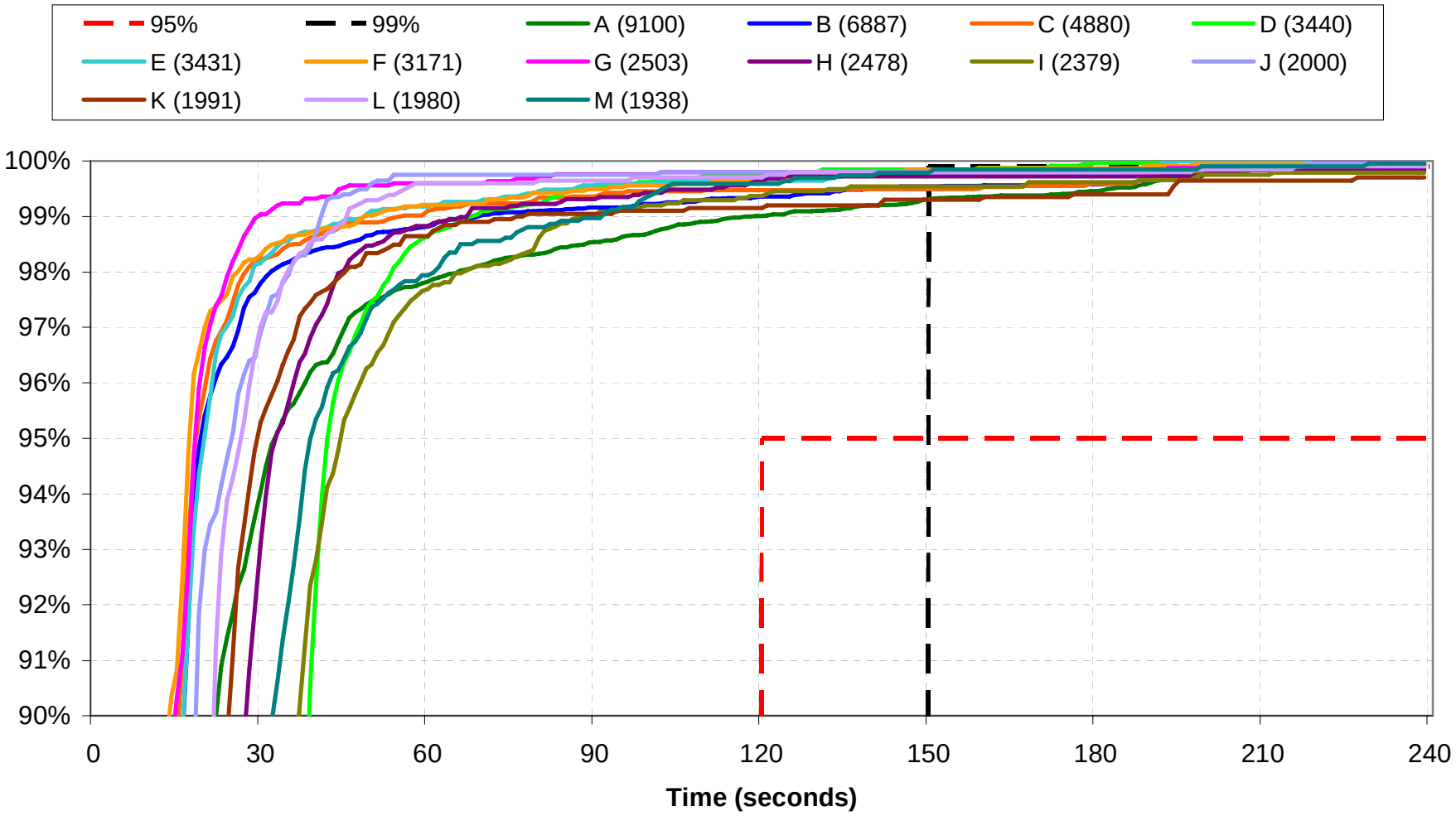
Oakland FIR SAT RGS-By Operator
CPDLC Actual Communication Performance (TRN)
(Reported DSP Outages Excluded)



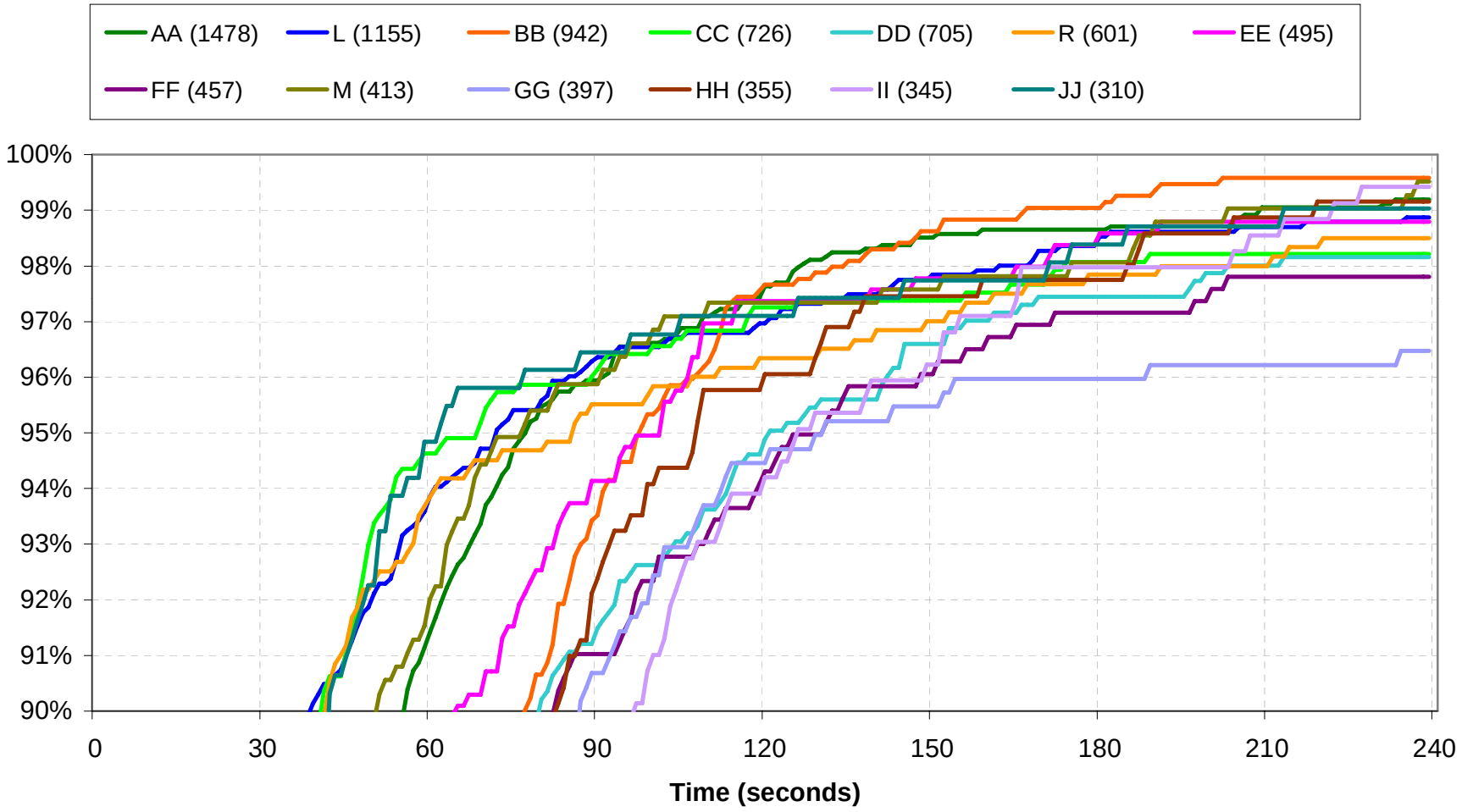
New York FIR SAT RGS-By Operator
CPDLC Actual Communication Technical Performance (ACTP)
(Reported DSP Outages Excluded)



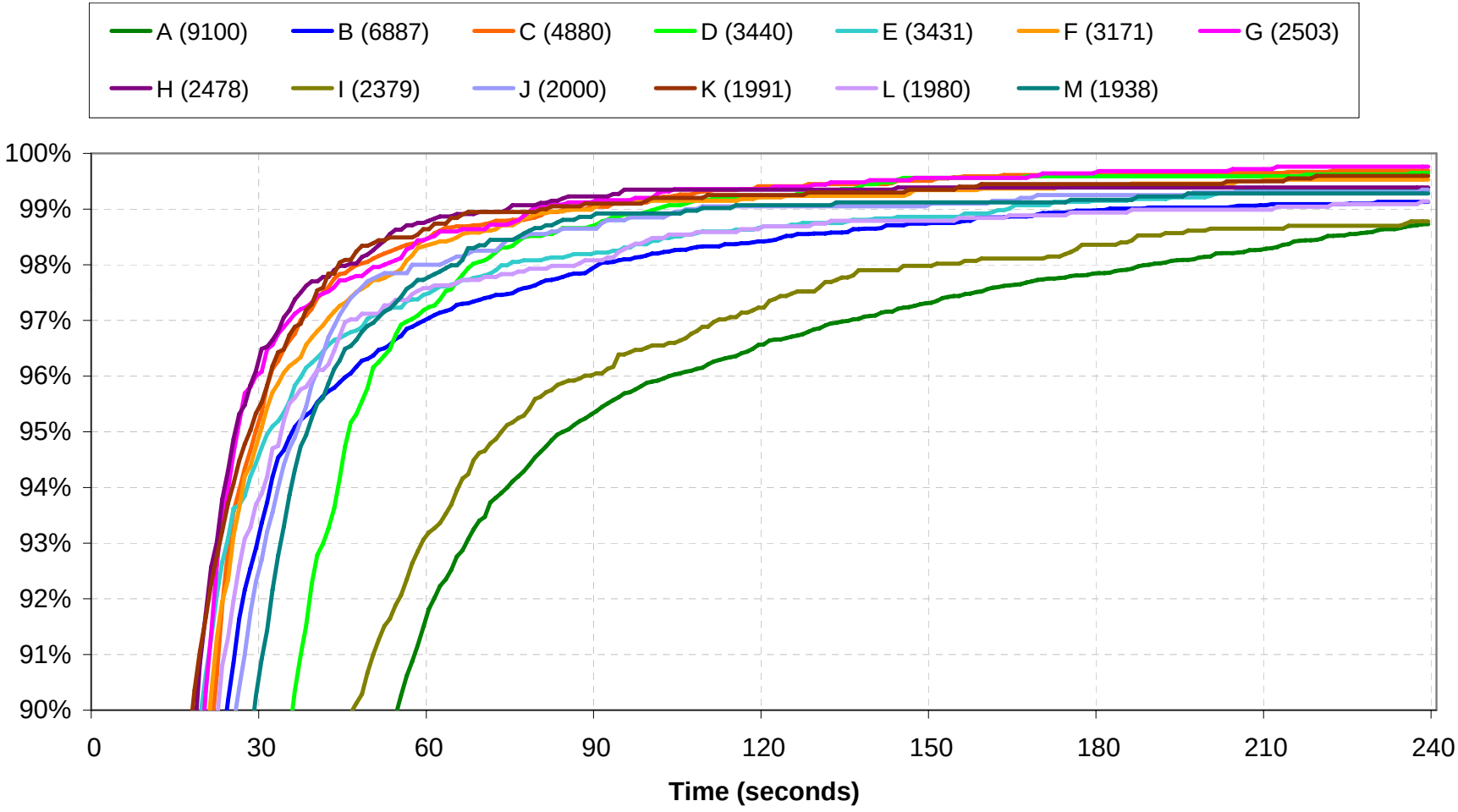
Oakland FIR SAT RGS-By Operator
CPDLC Actual Communication Technical Performance (ACTP)
(Reported DSP Outages Excluded)



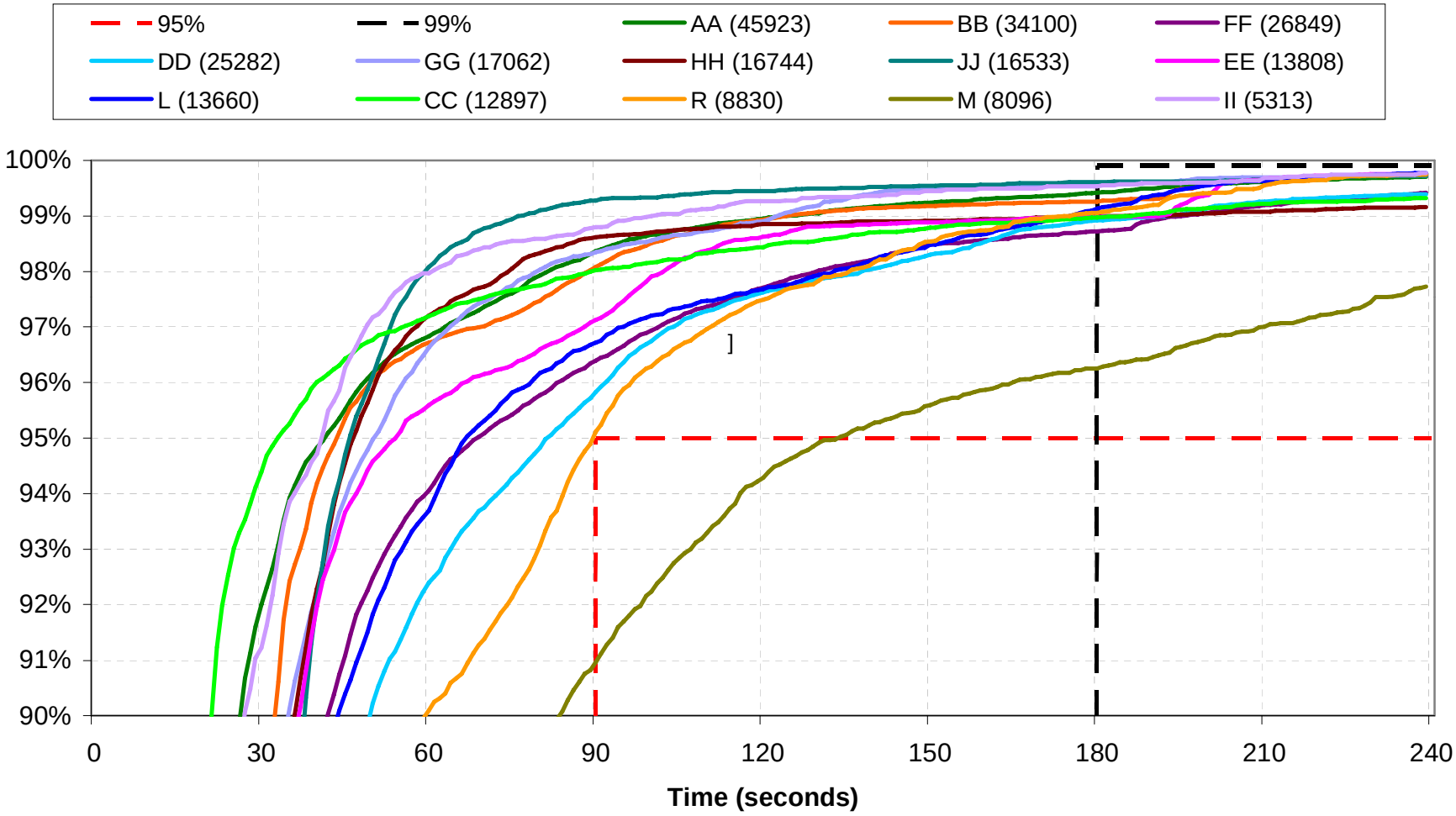
New York FIR SAT RGS-By Operator
CPDLC Pilot Operational Response Time (PORT)
(Reported DSP Outages Excluded)



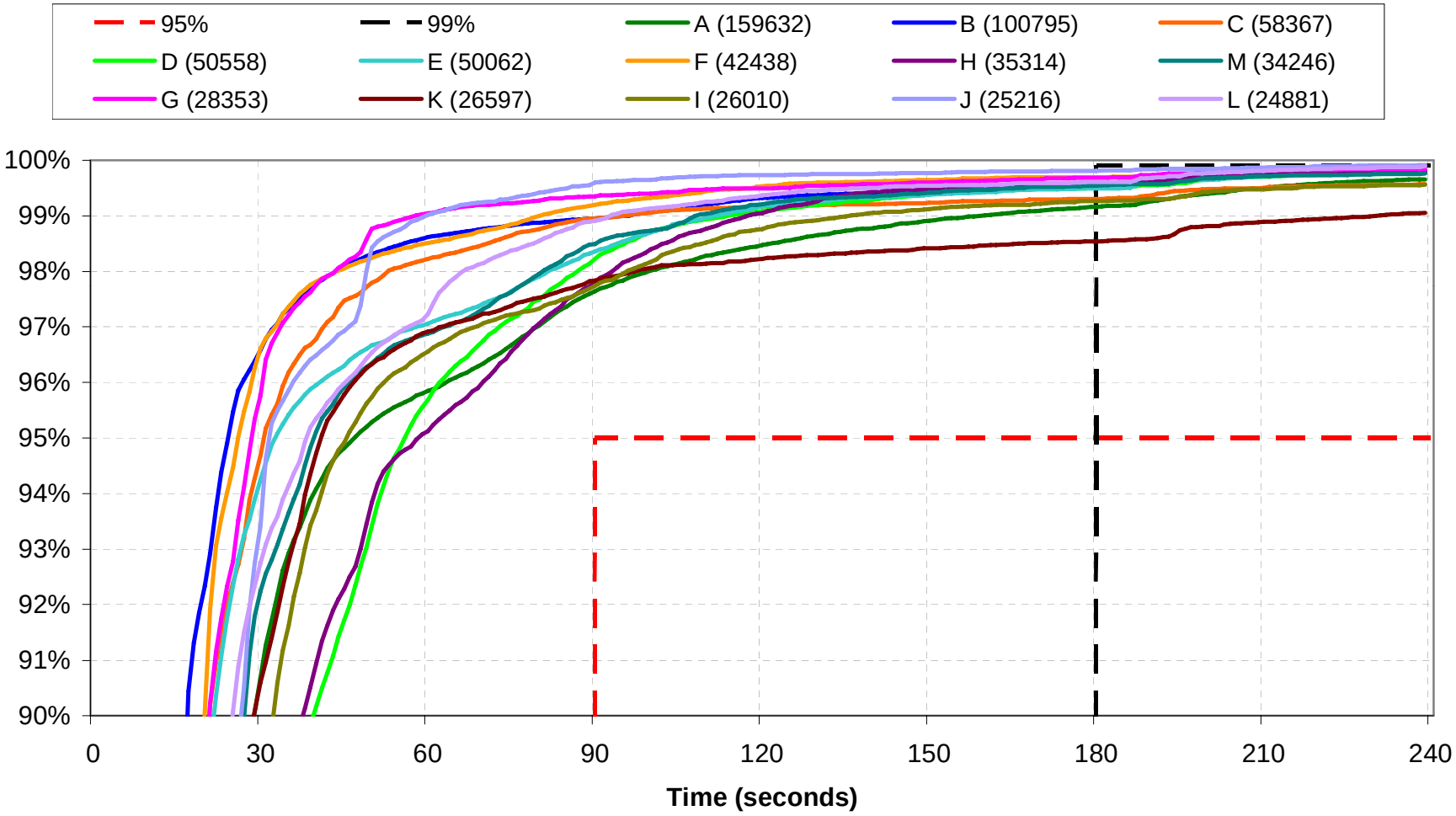
Oakland FIR SAT RGS-By Operator
CPDLC Pilot Operational Response Time (PORT)
(Reported DSP Outages Excluded)



New York FIR SAT RGS-By Operator
ADS-C Downlink Latency
(Reported DSP Outages Excluded)



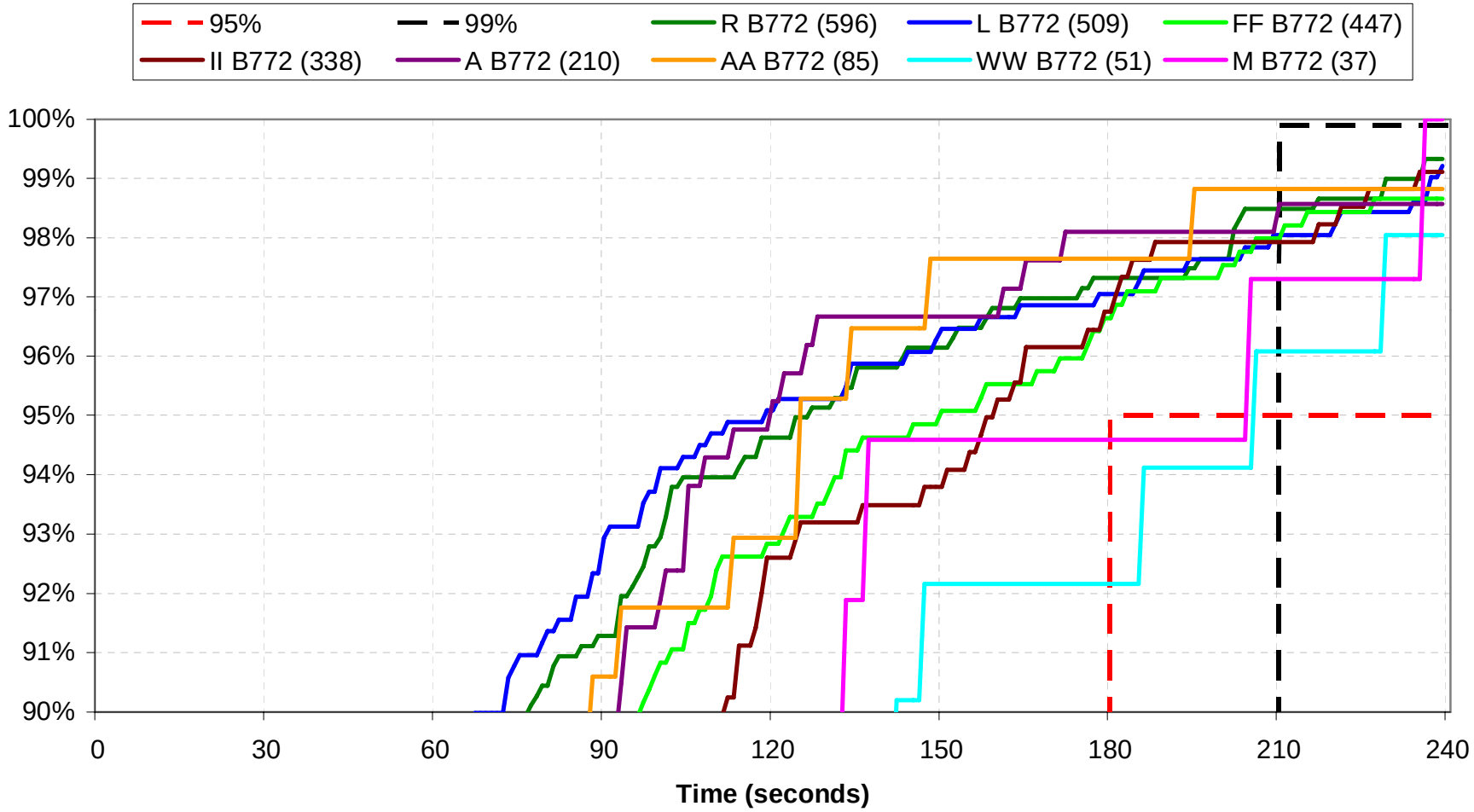
Oakland FIR SAT RGS-By Operator
ADS-C Downlink Latency
(Reported DSP Outages Excluded)



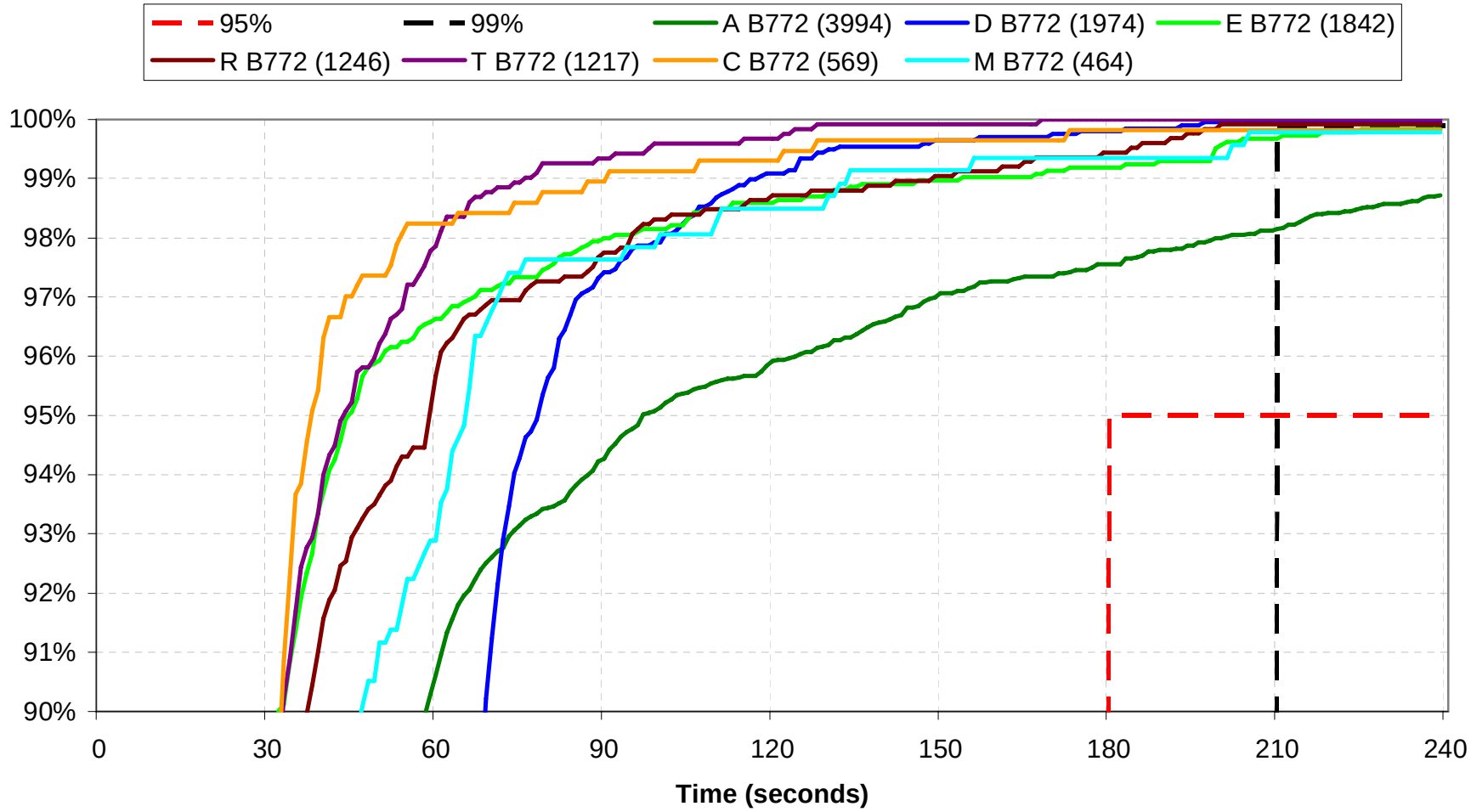
B772 Performance by Operator

- **Top 8 B772 operators in terms of message counts**
- **ACP, ACTP, PORT, and ADS-C for SATCOM data link only**
- **Data from New York and Oakland FIRs**
- **Operator information is desensitized**

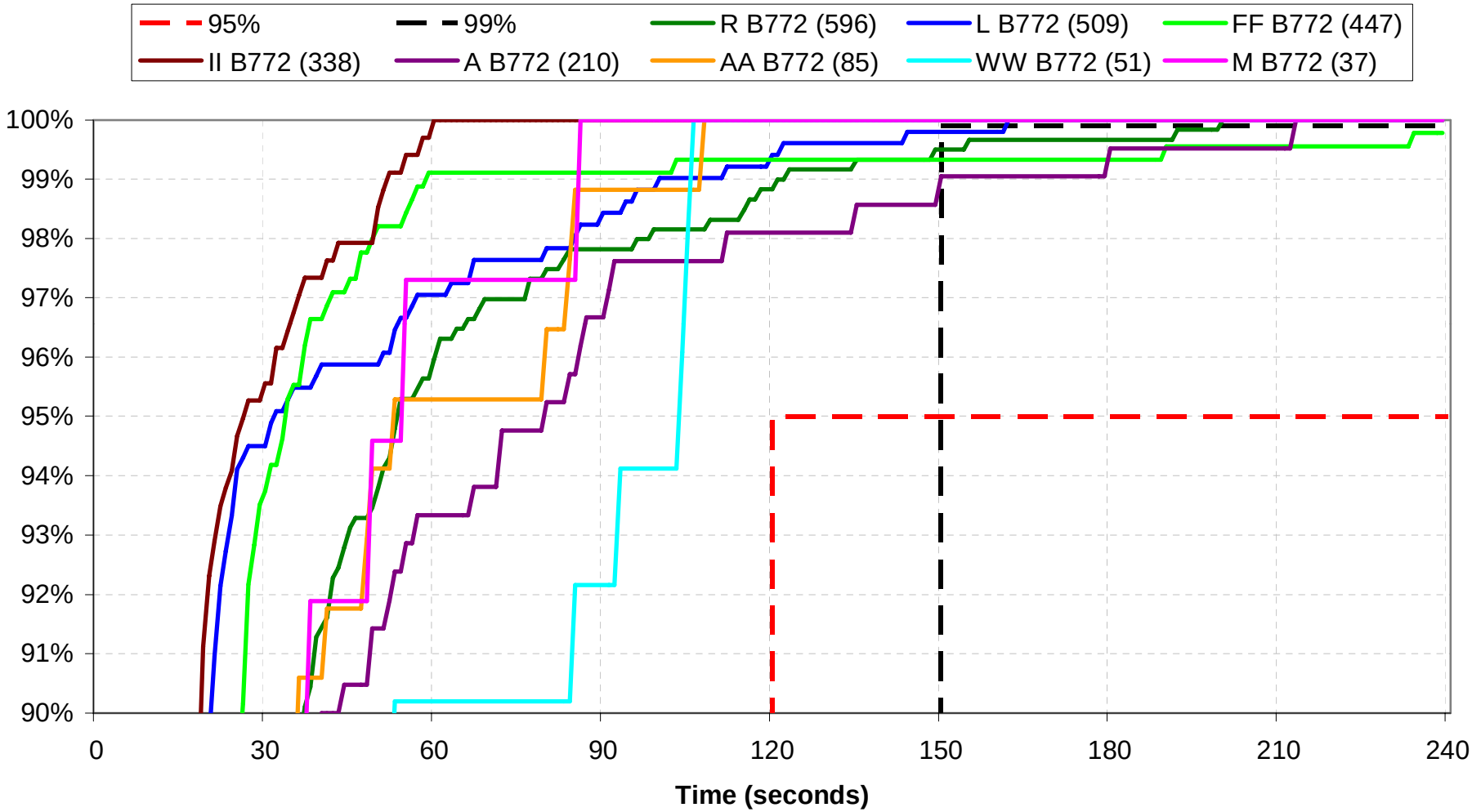
New York FIR SAT RGS-B772 Aircraft
CPDLC Actual Communication Performance (TRN)
(Reported DSP Outages Excluded)



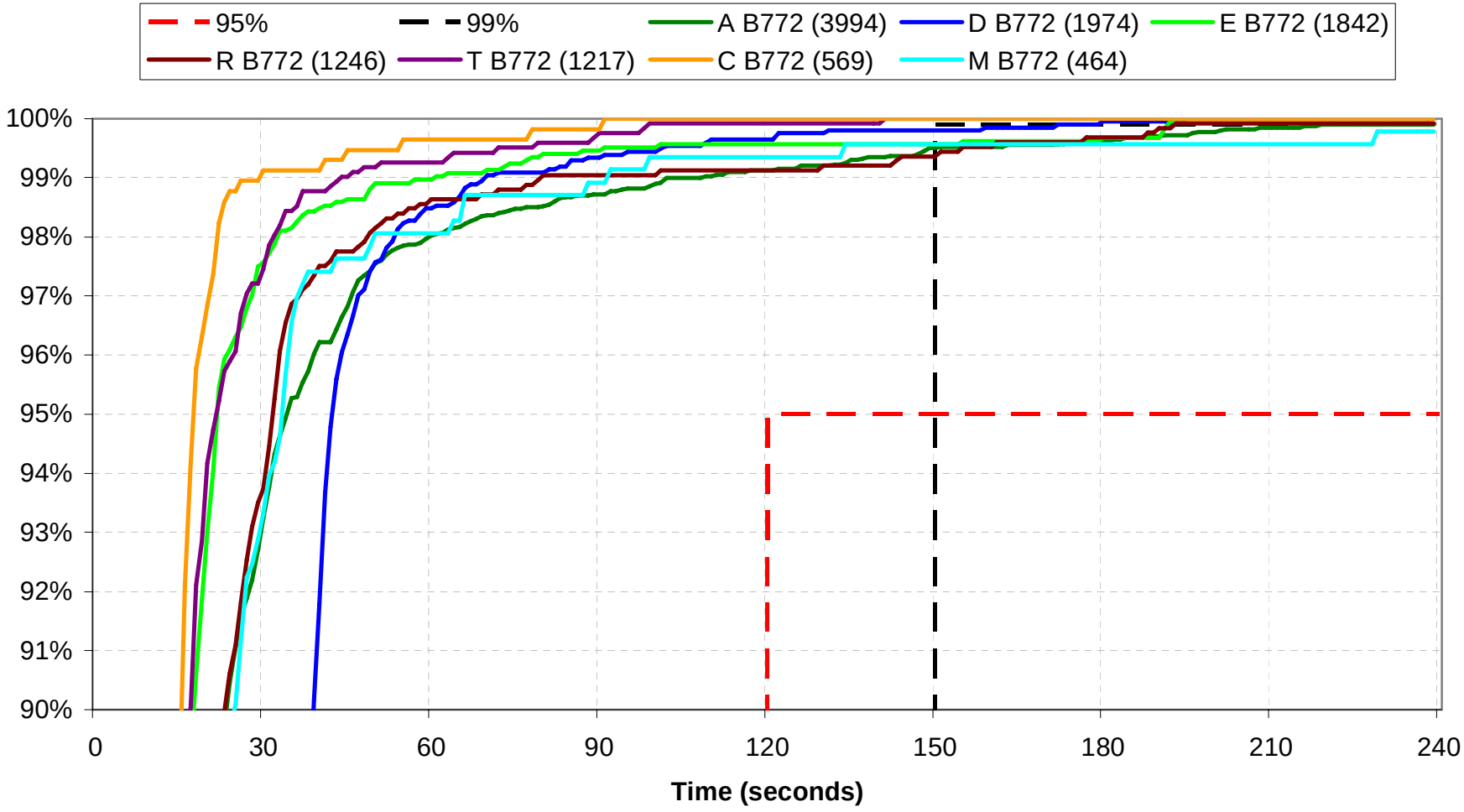
Oakland FIR SAT RGS-B772 Aircraft
CPDLC Actual Communication Performance (TRN)
(Reported DSP Outages Excluded)



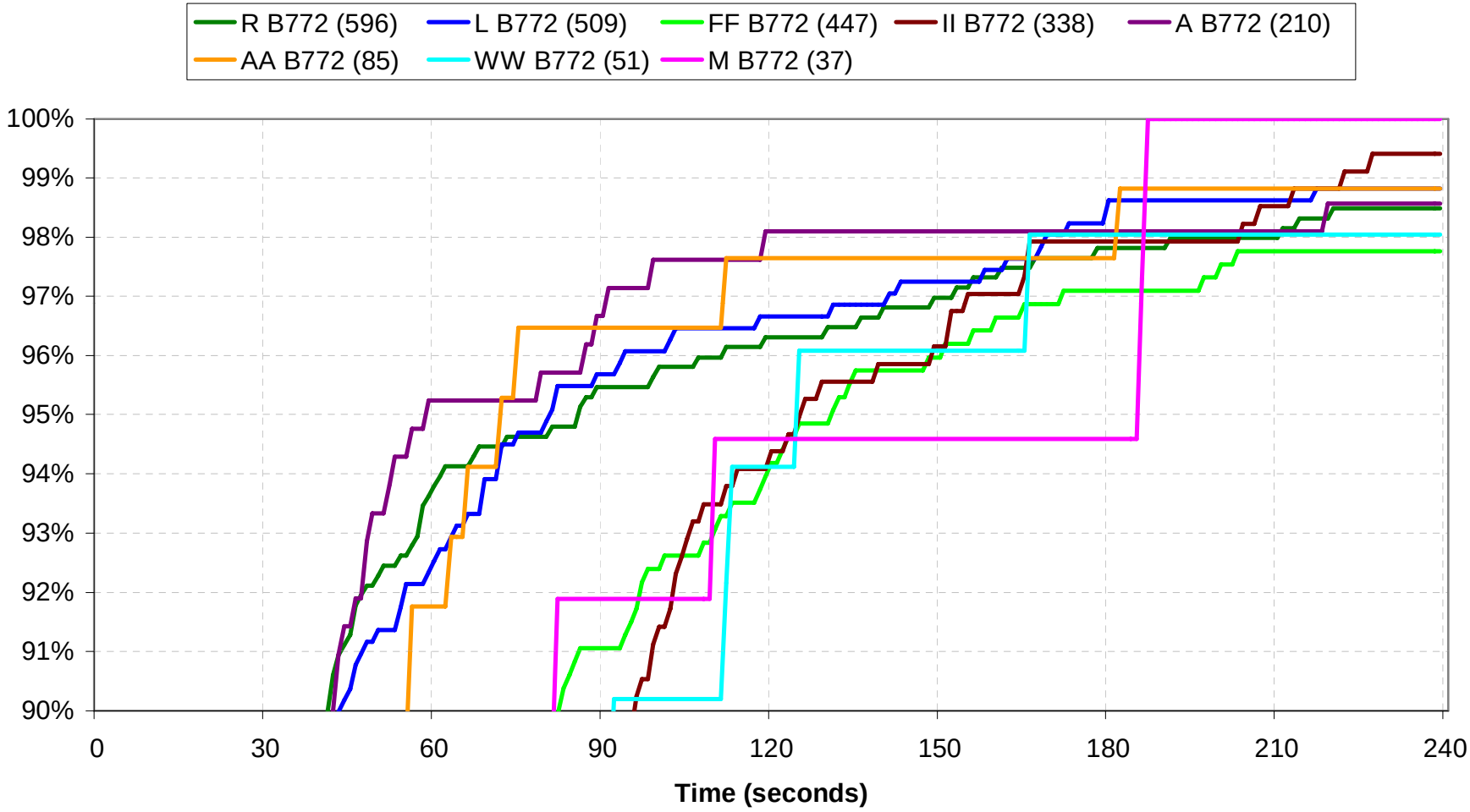
New York FIR SAT RGS-B772 Aircraft
CPDLC Actual Communication Technical Performance (ACTP)
(Reported DSP Outages Excluded)



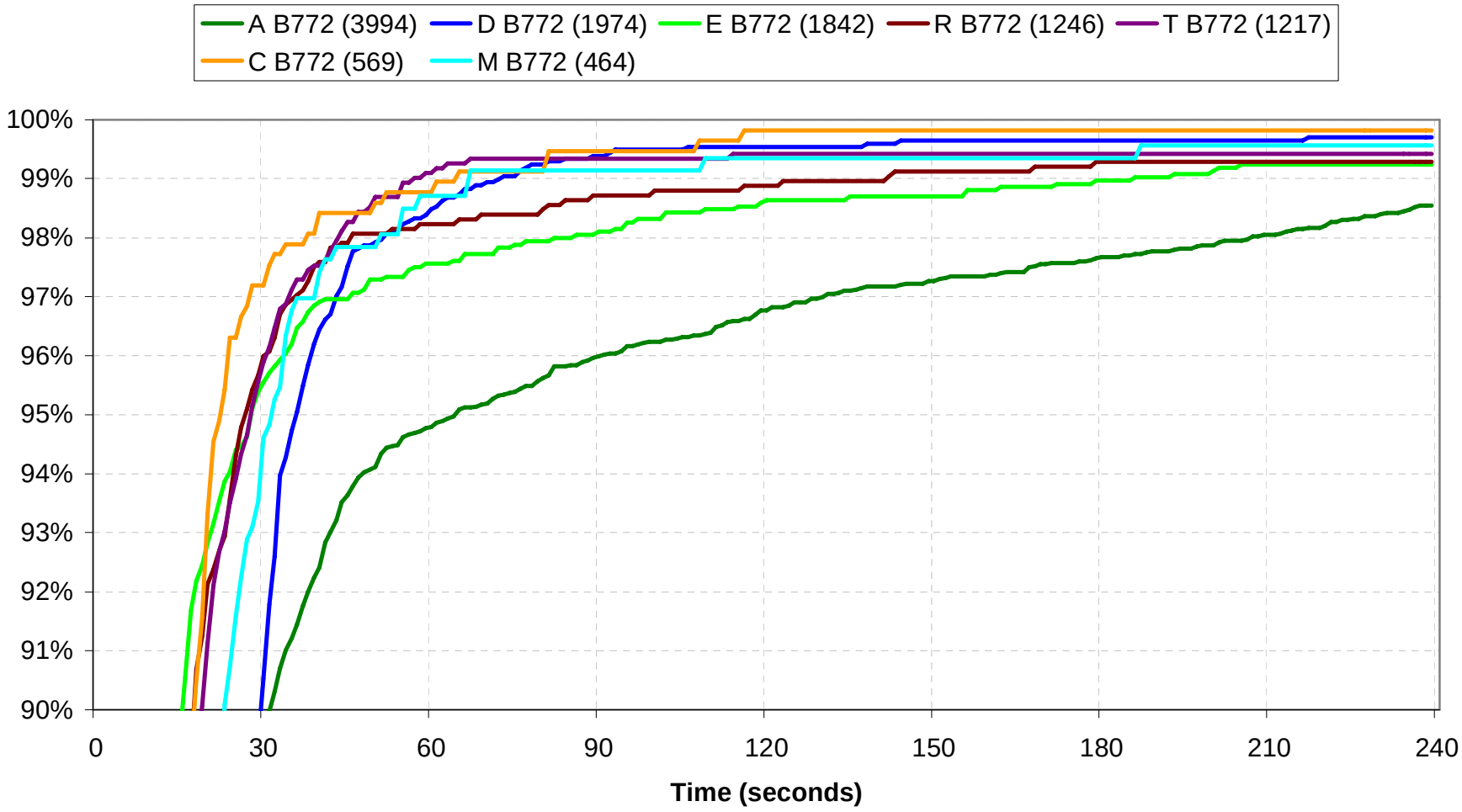
Oakland FIR SAT RGS-B772 Aircraft
CPDLC Actual Communication Technical Performance (ACTP)
(Reported DSP Outages Excluded)



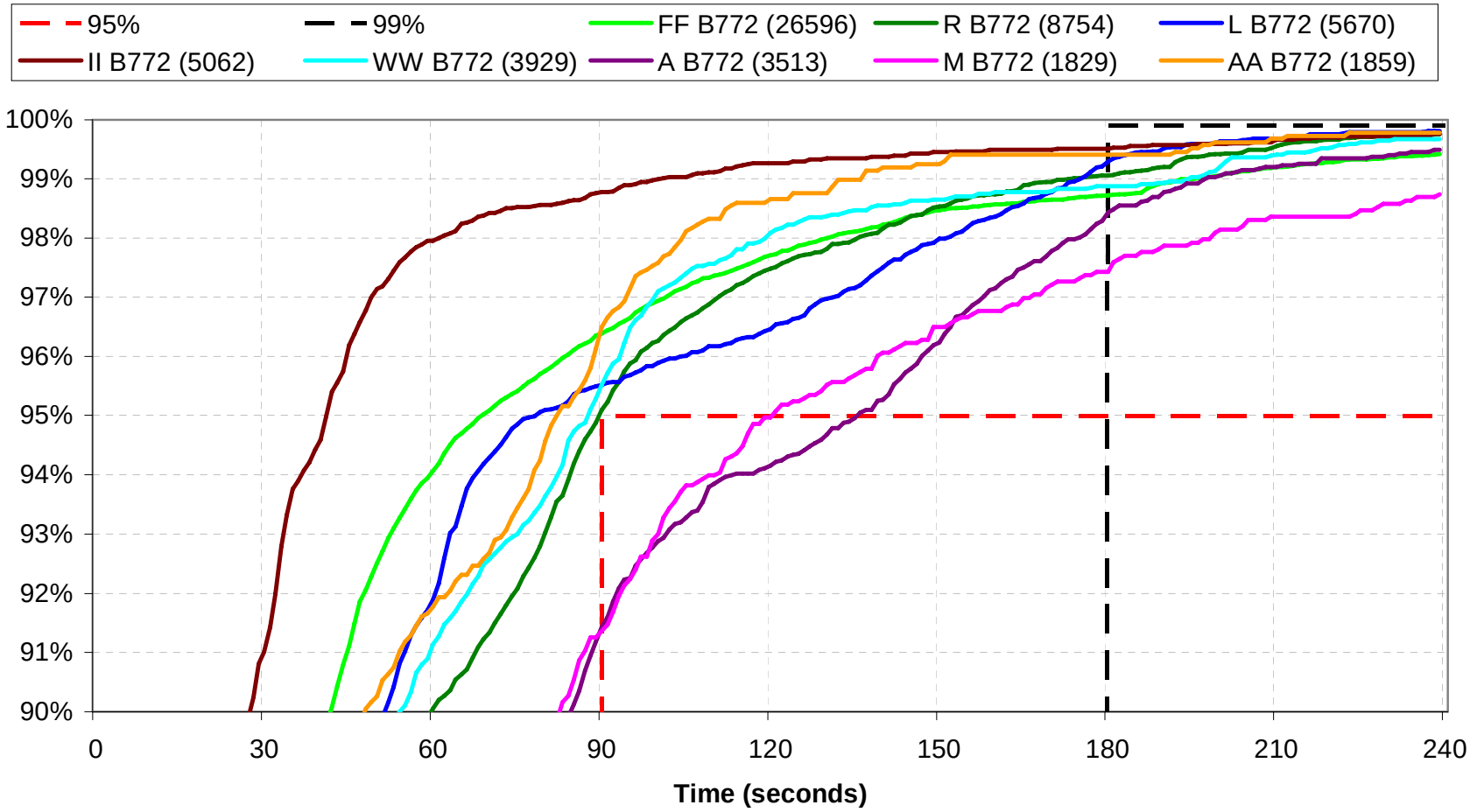
New York FIR SAT RGS-B772 Aircraft
CPDLC Pilot Operational Response Time (PORT)
(Reported DSP Outages Excluded)



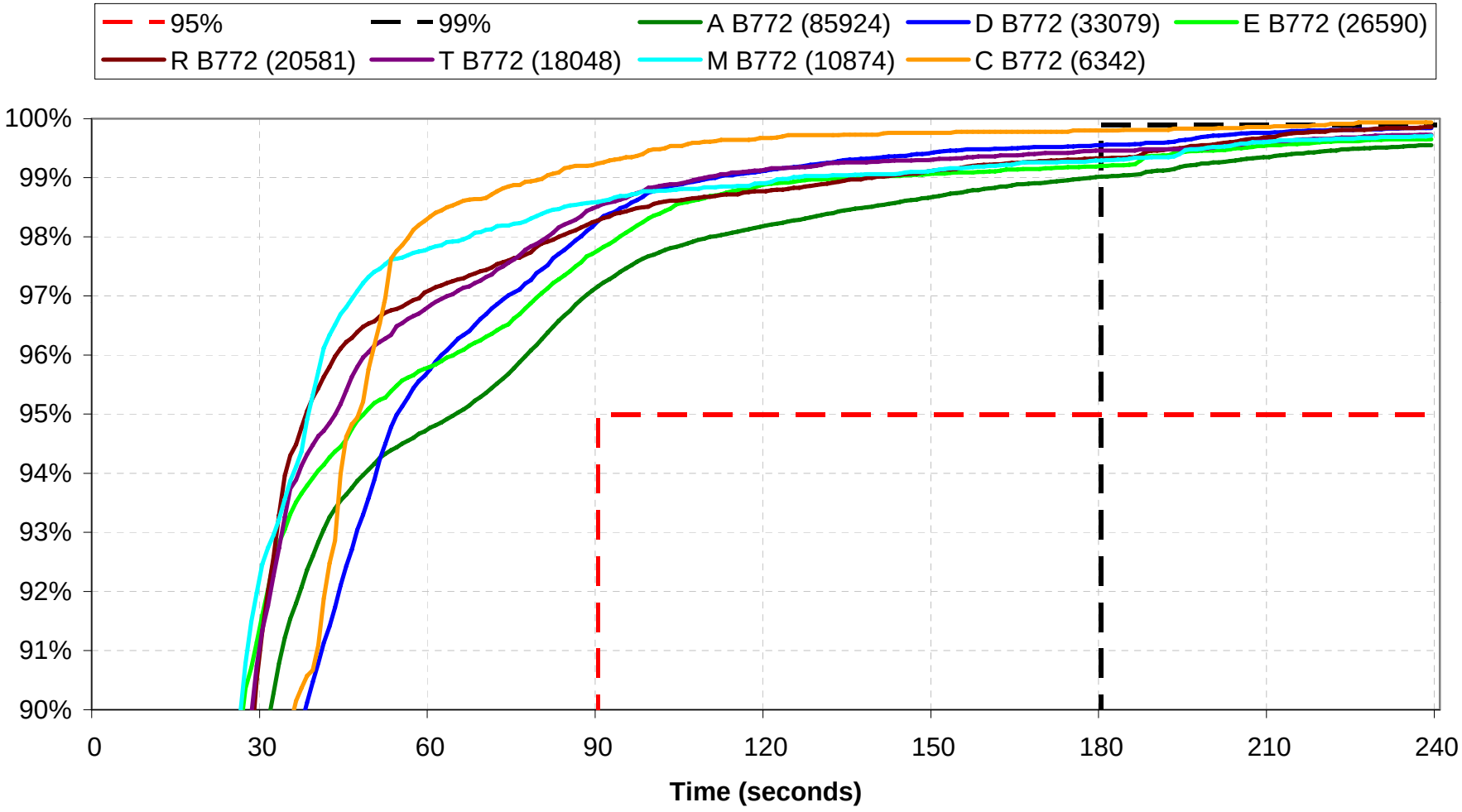
Oakland FIR SAT RGS-B772 Aircraft
CPDLC Pilot Operational Response Time (PORT)
(Reported DSP Outages Excluded)



New York FIR SAT RGS-B772 Aircraft
ADS-C Downlink Latency
(Reported DSP Outages Excluded)



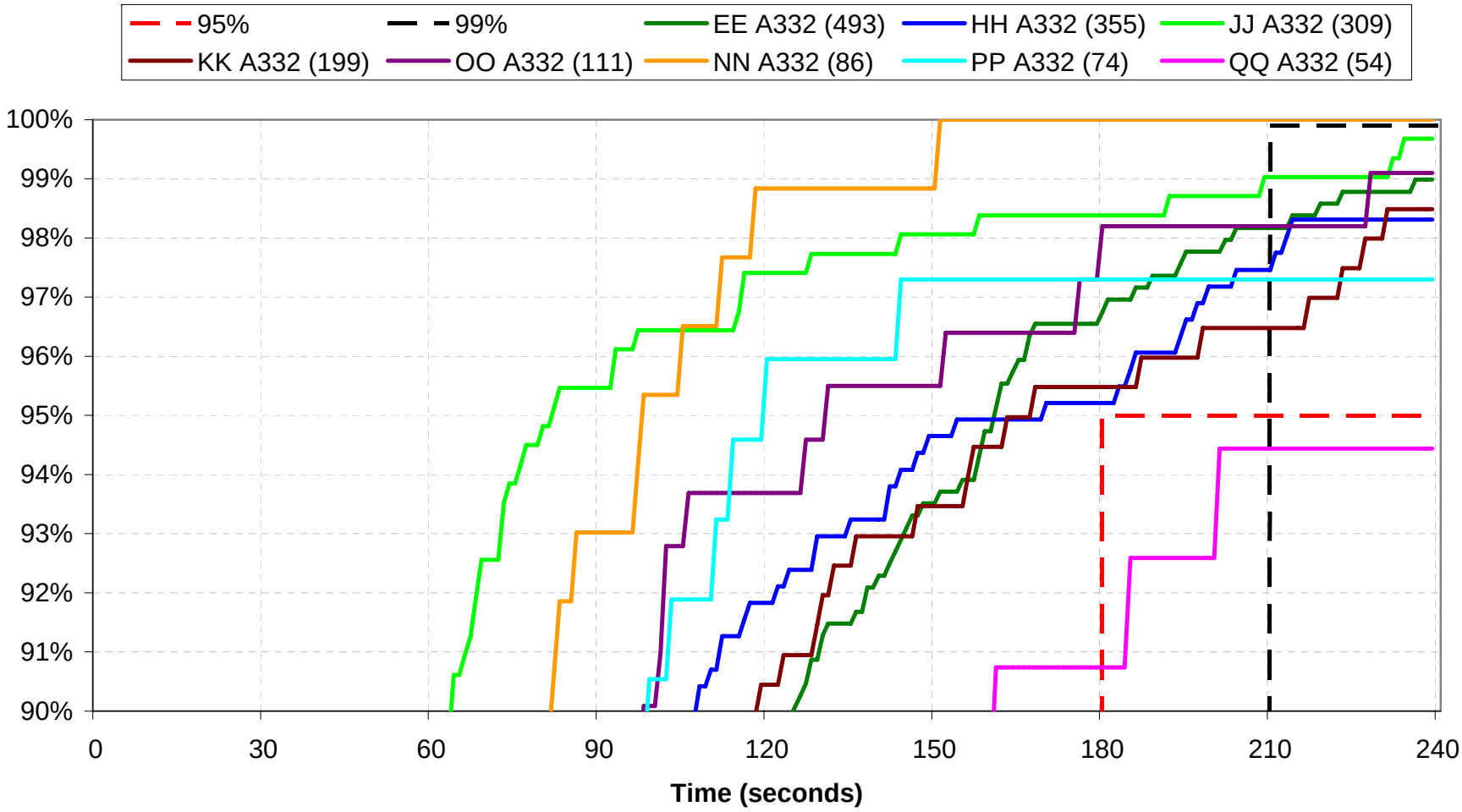
Oakland FIR SAT RGS-B772 Aircraft
ADS-C Downlink Latency
(Reported DSP Outages Excluded)



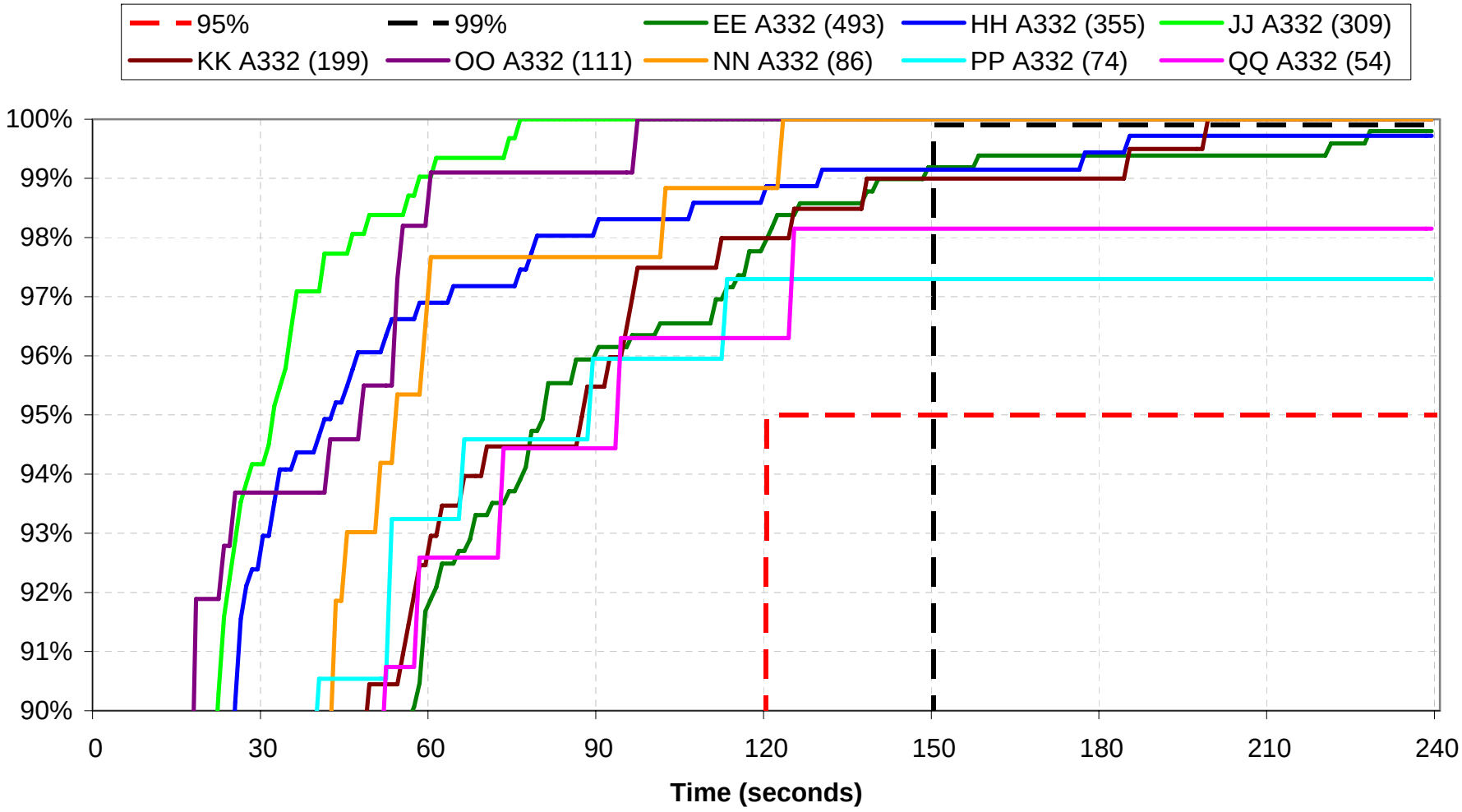
A332 Performance by Operator

- **Top 8 A332 operators in terms of data link message counts**
- **ACP, ACTP, PORT, and ADS-C for SATCOM data link only**
- **Operator information is desensitized**

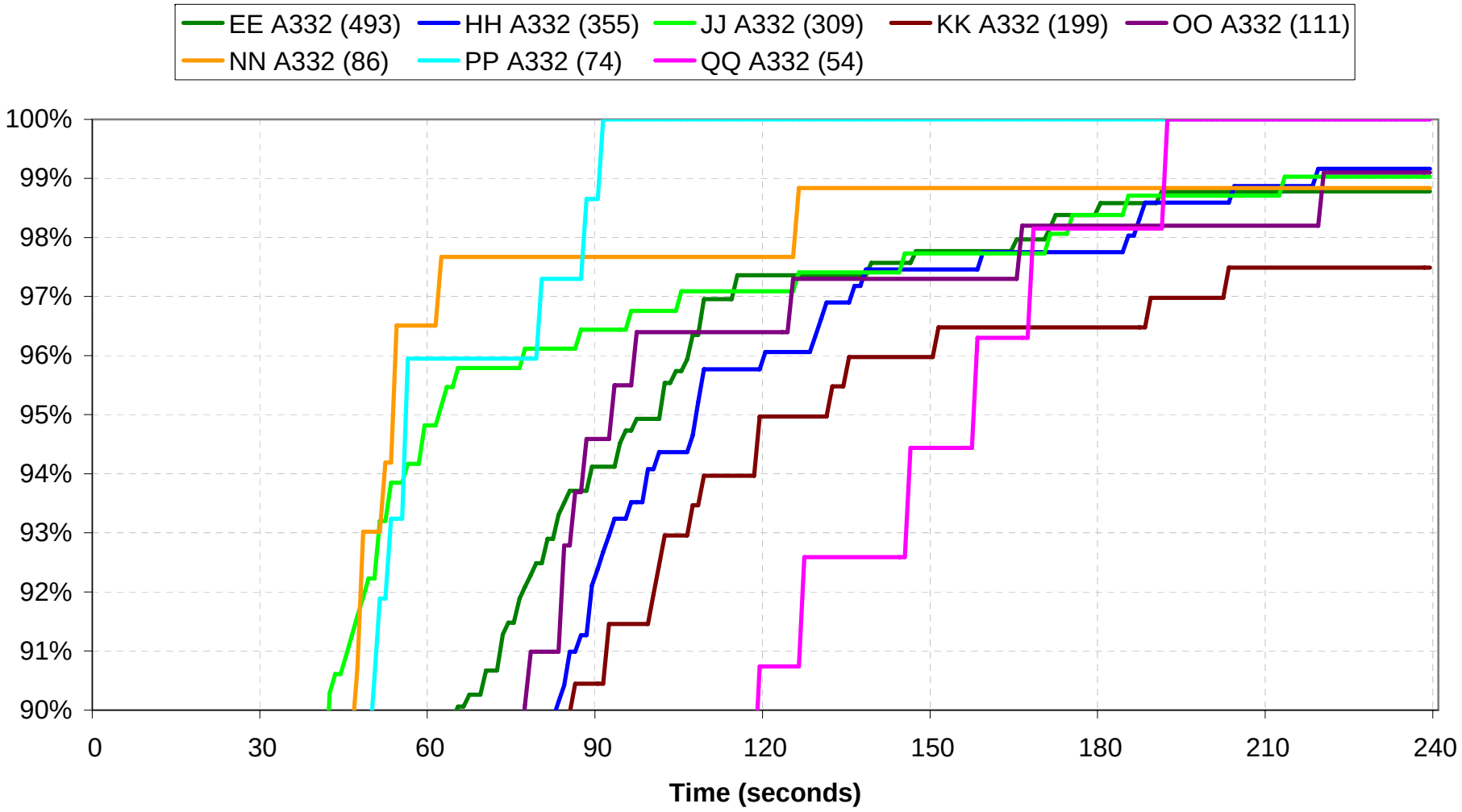
New York FIR SAT RGS-A332 Aircraft
CPDLC Actual Communication Performance (TRN)
(Reported DSP Outages Excluded)



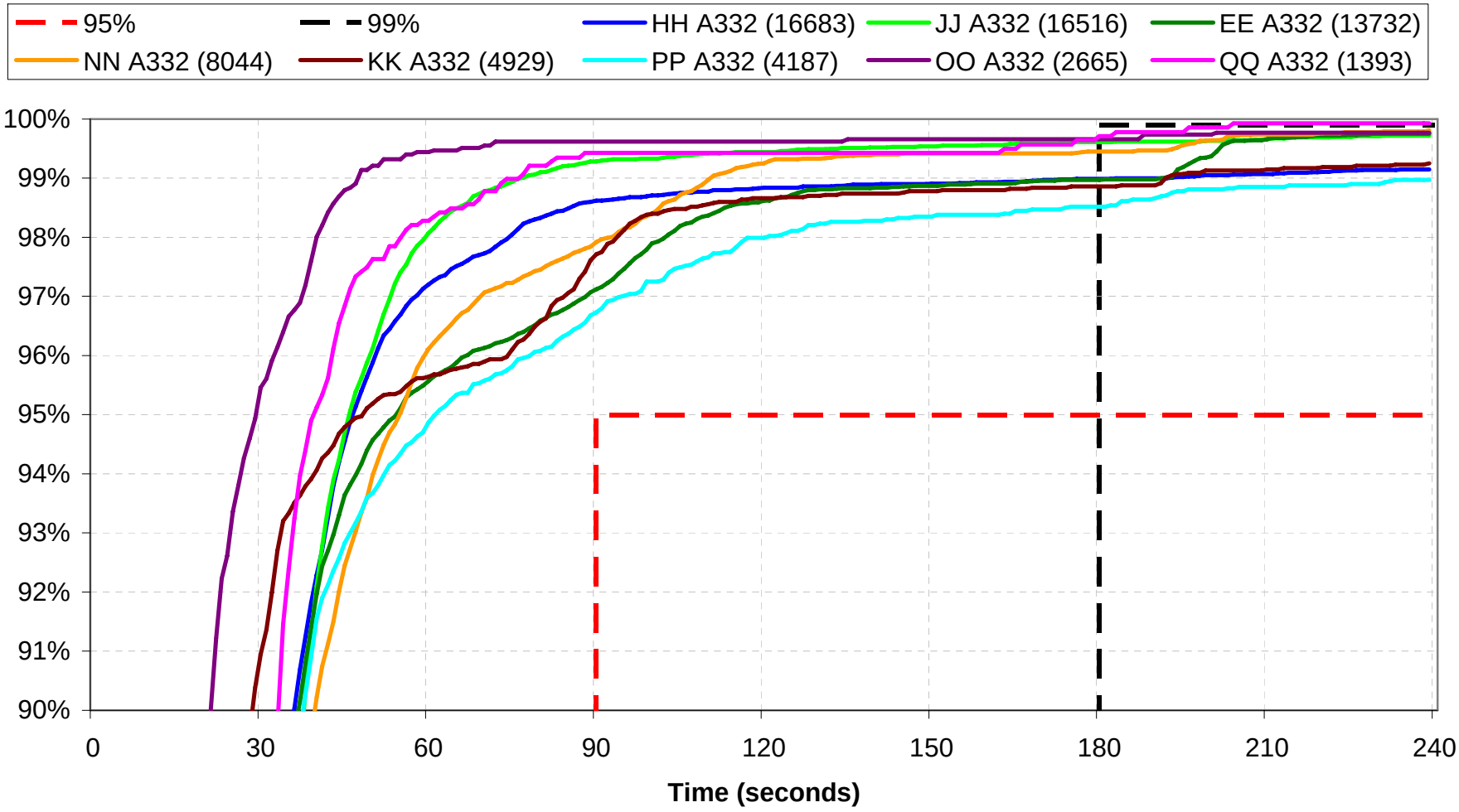
New York FIR SAT RGS-A332 Aircraft
CPDLC Actual Communication Technical Performance (ACTP)
(Reported DSP Outages Excluded)



New York FIR SAT RGS-A332 Aircraft
CPDLC Pilot Operational Response Time (PORT)
(Reported DSP Outages Excluded)



New York FIR SAT RGS-A332 Aircraft
ADS-C Downlink Latency
(Reported DSP Outages Excluded)



Errors in the Estimated Time of Arrival at Next Position in ADS-C Reports

- **ADS-C position reports message types with estimate of next compulsory waypoint**
  - Waypoint Change Report (WPC)
  - Basic Periodic Report (BAS)
- **Reports with the current position time exactly equal to the estimate of time over next compulsory waypoint (time interval to next waypoint given as zero) were extracted from the data for further analysis**

Initial Counts

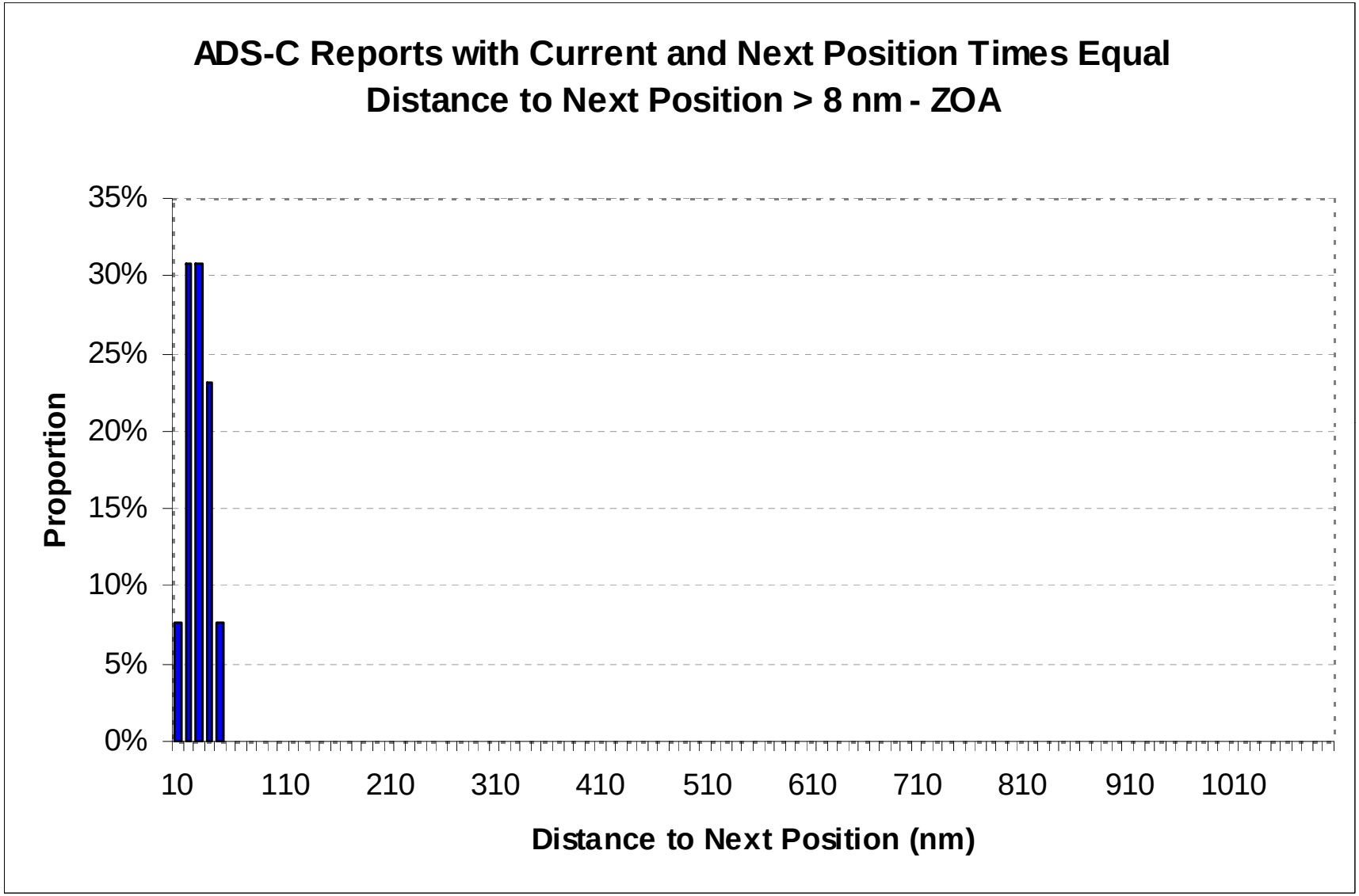
Month	Oakland	New York
August 2009	63	24
September 2009	52	91
October 2009	53	103
November 2009	48	89
December 2009	44	84
January 2010	44	89
Totals	304	480

Data Filter

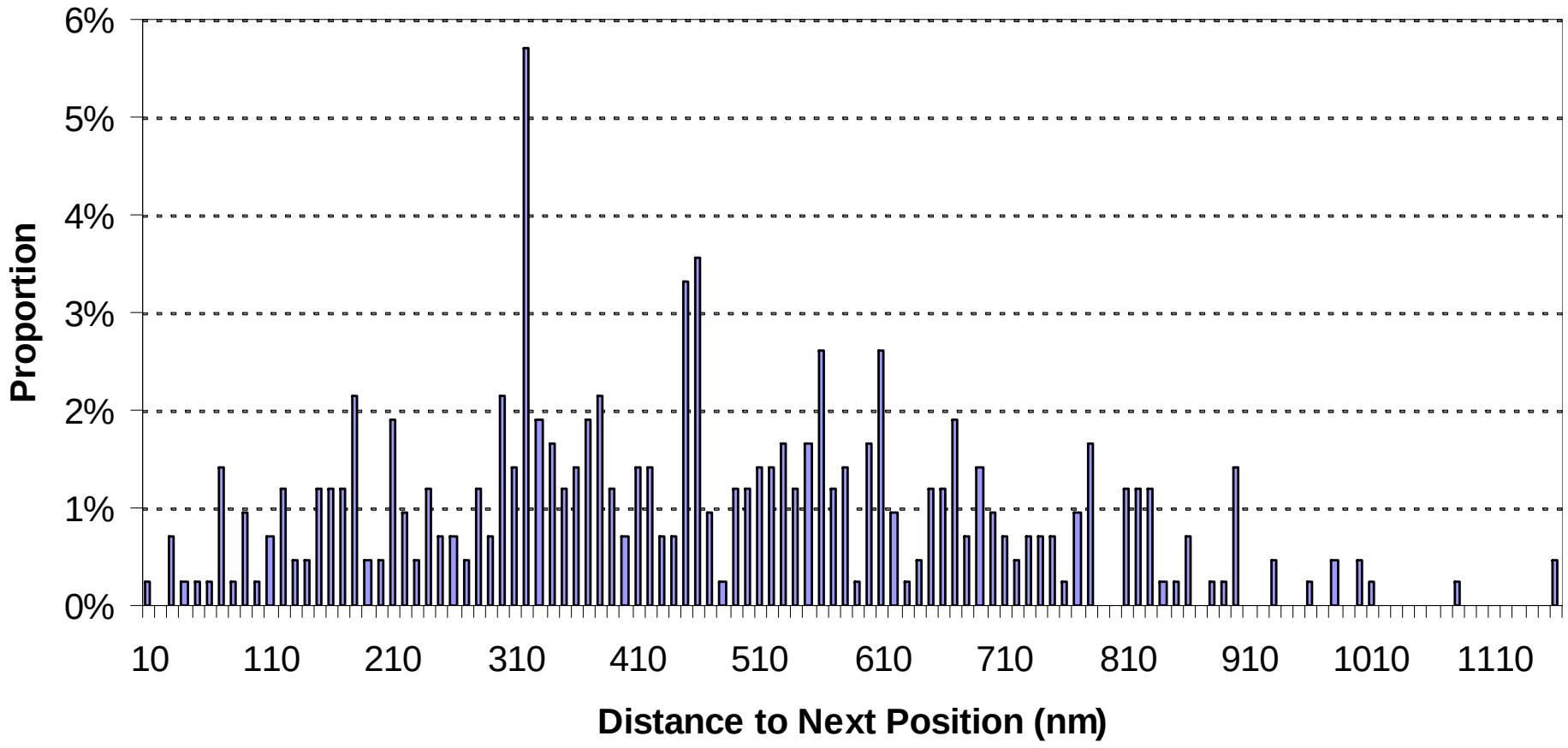
- **Distance between the current position and the estimated next position calculated as a great circle distance**
- **Taking into account the available precision in the time data provided in each ADS-C report and the assumed average aircraft speed of 8nm/minute, the reports with an estimated distance to the next position of 8 nm or less were removed from the analysis**

Refined Data Set

Month	Oakland	New York
August 2009	4	10
September 2009	3	81
October 2009	4	98
November 2009	0	78
December 2009	1	77
January 2010	1	77
Totals	13	421


ADS-C Reports with Current and Next Position Times Equal
Distance to Next Position > 8 nm - ZOA
Proportion
35%
30%
25%
20%
15%
10%
5%
0%
10
110
210
310
410
510
610
710
810
910
1010
Distance to Next Position (nm)

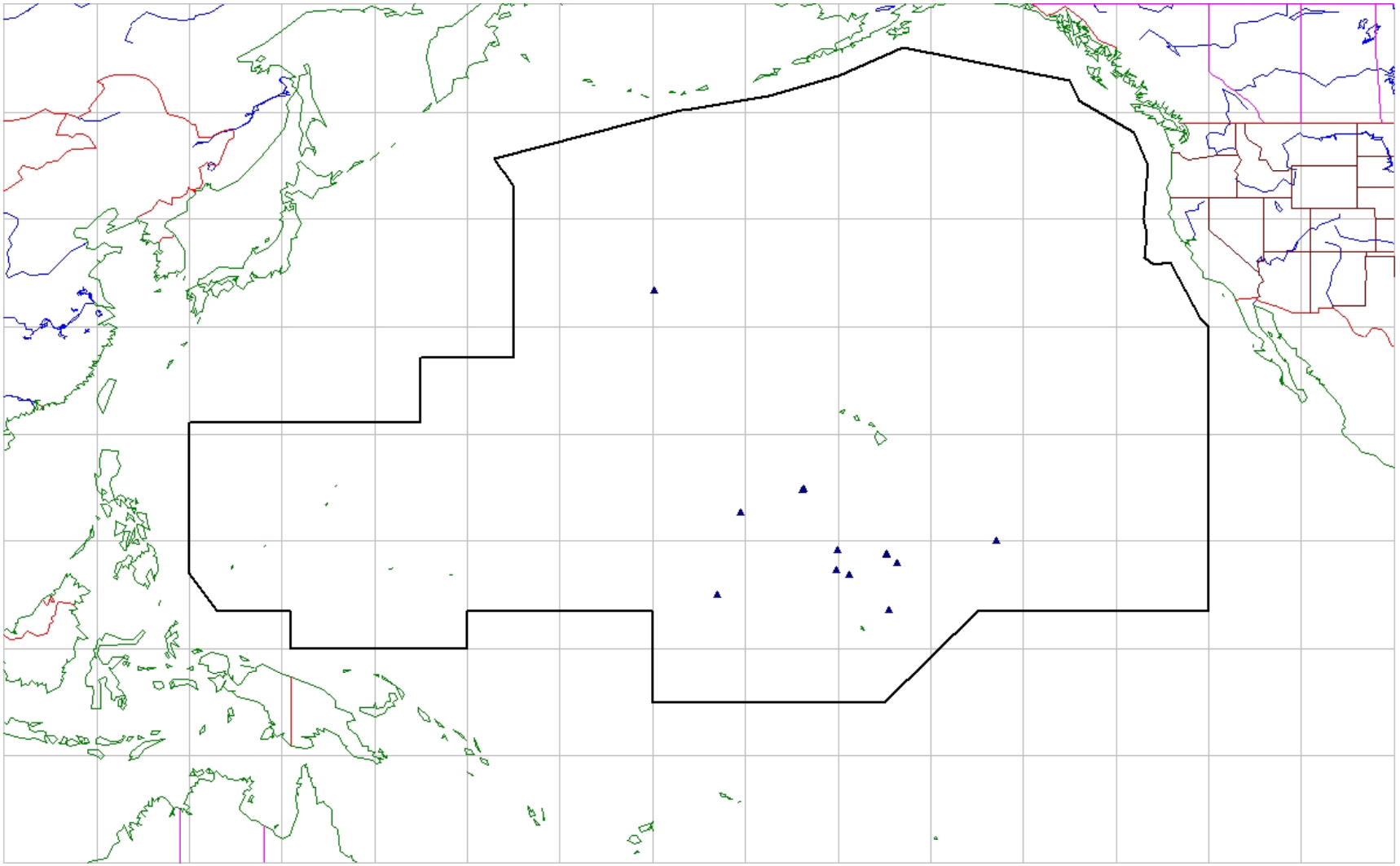
ADS-C Reports with Current and Next Position Times Equal
Distance to Next Position > 8nm - ZNY



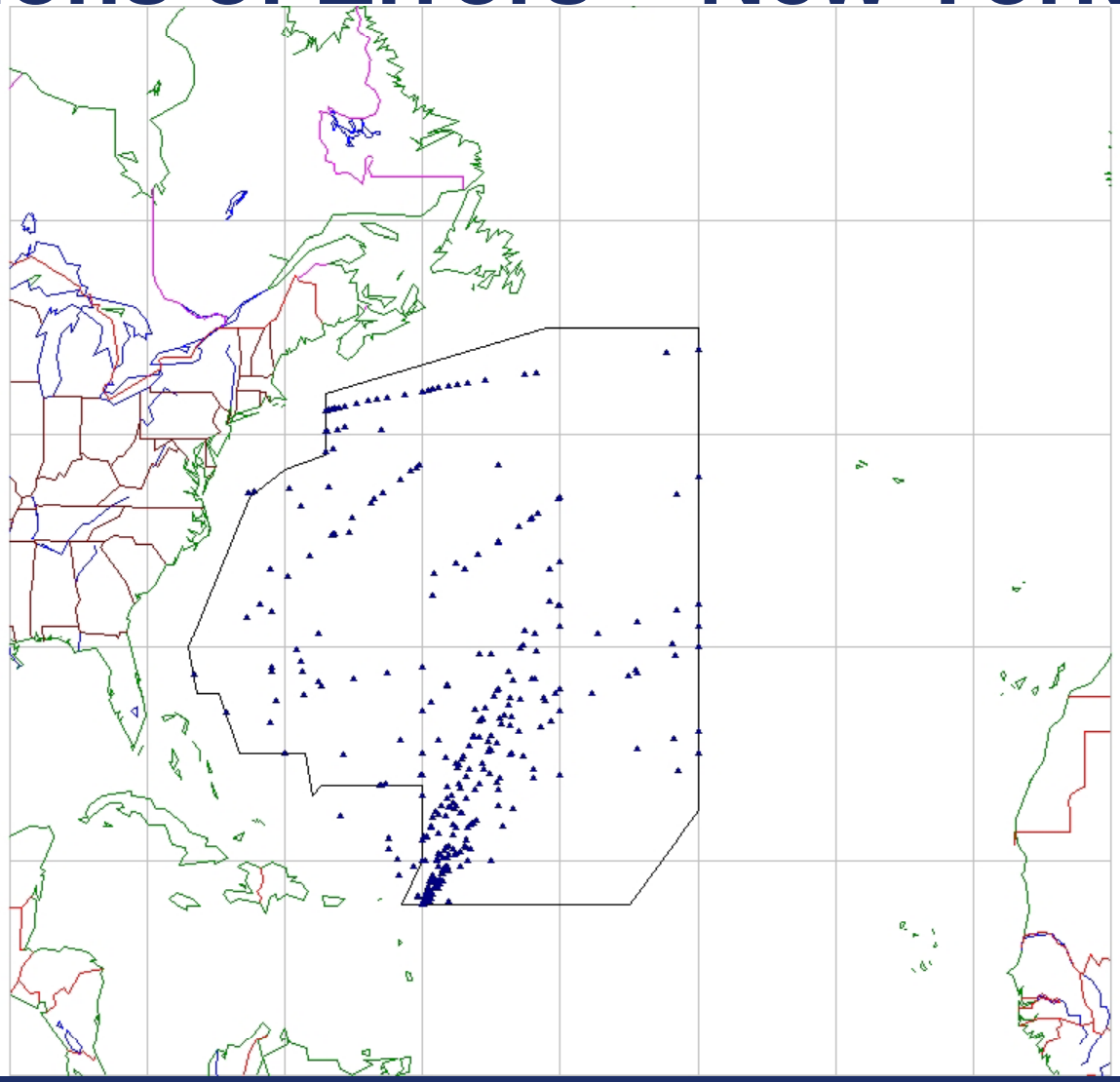
Observed Aircraft Types

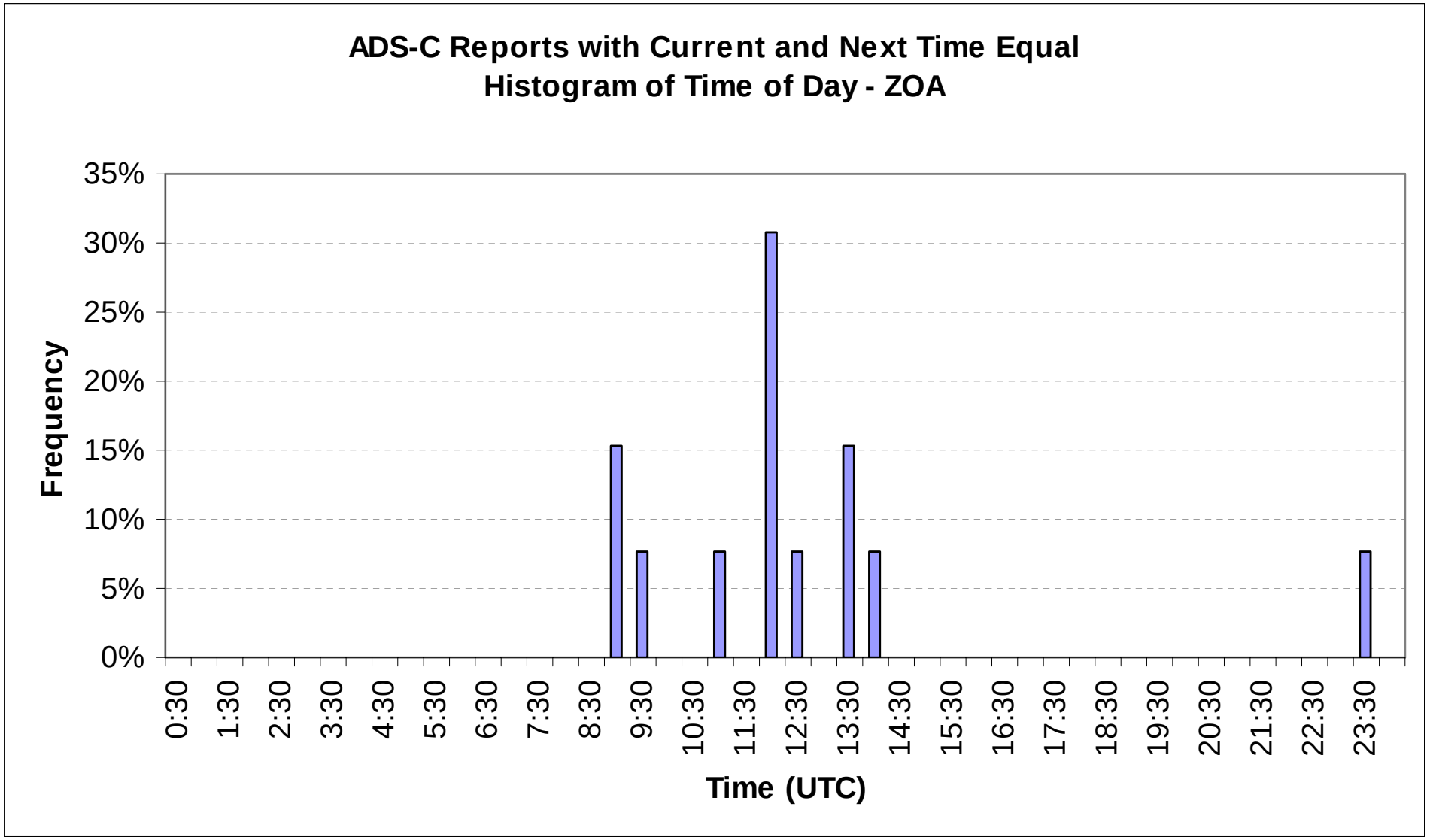
- **Oakland**
  - All 13 errors involved B744 aircraft
- **New York**
  - All 421 errors involved Airbus aircraft
    - A332 – 21.14 %
    - A333 – 9.74 %
    - A343 – 39.43 %
    - A346 - 29.69 %

Locations of Errors – Oakland FIR

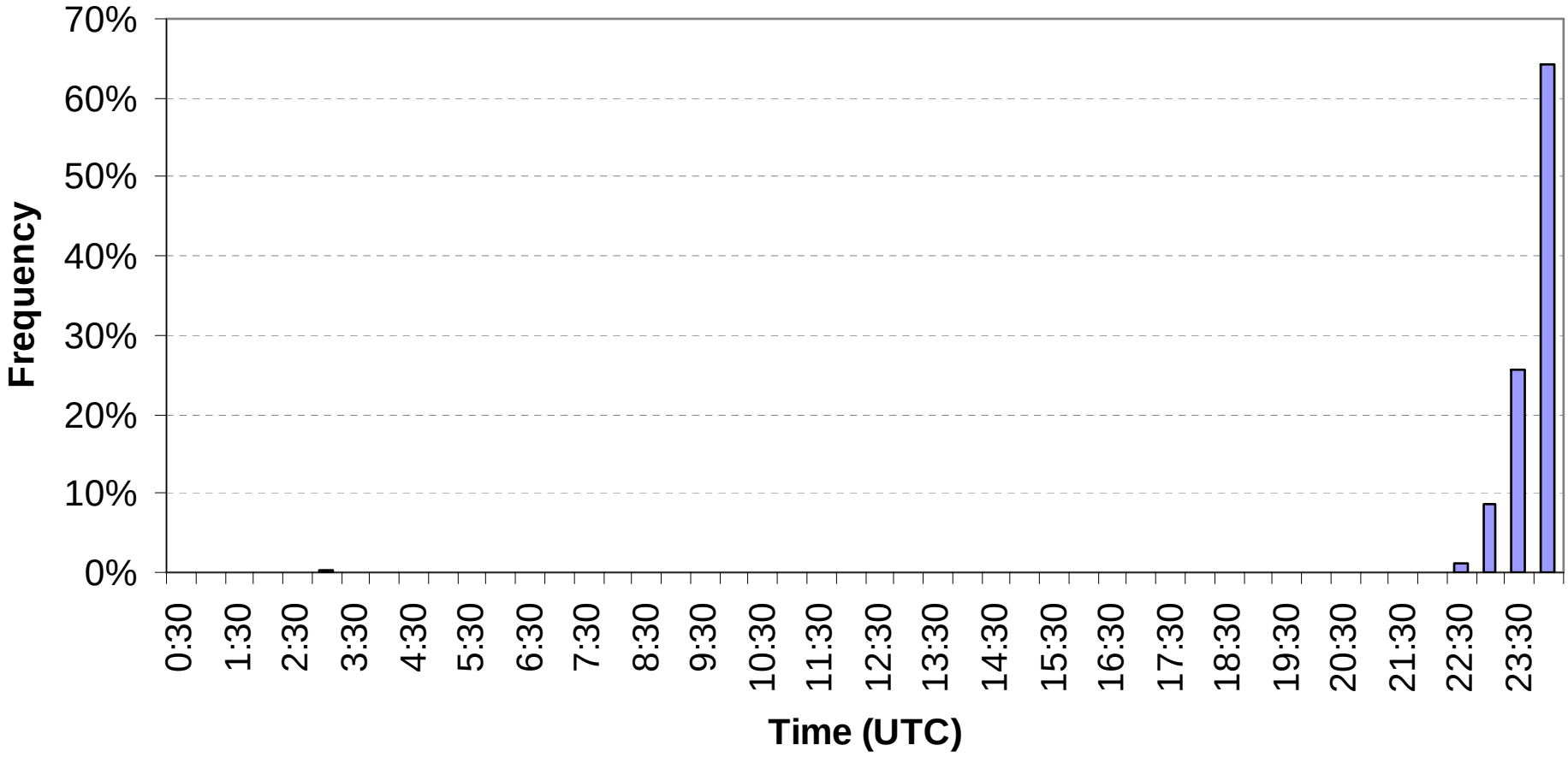


Locations of Errors – New York FIR




ADS-C Reports with Current and Next Time Equal
Histogram of Time of Day - ZOA
Frequency
35%
30%
25%
20%
15%
10%
5%
0%
0:30
1:30
2:30
3:30
4:30
5:30
6:30
7:30
8:30
9:30
10:30
11:30
12:30
13:30
14:30
15:30
16:30
17:30
18:30
19:30
20:30
21:30
22:30
23:30
Time (UTC)

ADS-C Reports with Current and Next Positions Times Equal
Histogram of Position Times - ZNY



Conclusion

- **The New York data involving Airbus aircraft show a pattern associated with the time of day**
- **The FAA has notified Airbus of the problem with ADS-C position reporting**
- **Airbus has responded and indicated that the problem has been identified and plans a fix for 2012**

RASMAG — TASK LIST

(last updated 10 August 2010)

ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
8/6	Take action to implement Long-Term Height Monitoring (LTHM) Actions 1, 5 and 6 as described in RASMAG/8 report. In particular, ensure arrangements for regional cooperation between regional monitoring agencies (RMAs).	RASMAG/13	Asia/Pacific RMAs	Open	RASMAG LTHM Actions promulgated by State Letter AP018/8 of 31 January 2008. RASMAG/9 informed no progress made due to priority workloads for all RMAs and Regional Office. RASMAG/10 informed of actions taken so far, update RASMAG/11 about progress RASMAG/12 agreed: LTHM Action 1 Open LTHM Action 2 Completed LTHM Action 3 Completed LTHM Action 4 Completed LTHM Action 5 Open LTHM Action 6 Open
10/2	Undertake studies to quantify the magnitude of the problem of RVSM non-approved flights operating in RVSM airspace. Identify solutions.	~~RASMAG/13~~ Ongoing	Asia/Pacific RMAs	Open	Lead RMA is PARMO. RMAs to work by correspondence, present adequate information to RASMAG/11 to compile briefing for APANPIRG PARMO provided update report to RASMAG/11, further development required before reporting to APANPIRG RMAs will provide RASMAG/13 with activity reports on solutions.

ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
10/7	Prepare Taxonomy of RMA-related terms with objective of clarifying and standardising reporting of Large Height Deviations (LHDs) by States and limiting under reporting. Consider inclusion of taxonomy as appendix to Regional Monitoring Impact Statement	RASMAG/13	Asia/Pacific RMAs	Open	Lead RMA is AAMA. RMAs to work by correspondence, present final version to RASMAG/11 for inclusion in impact statement
~~10/11~~	~~Standardise methodology of assessing duration of LHDs in application of the collision risk model (CRM)~~	~~RASMAG/13~~	~~Asia/Pacific RMAs~~	~~Open~~ Completed	~~Lead RMA is AAMA. RMAs to work by correspondence, present updated information to RASMAG/11.~~ ~~PARMO presented information to RASMAG/11 on durations for crossing flight levels, further study and update to RASMAG/12.~~ ~~PARMO will present updated information to RASMAG/13 on durations for crossing flight levels.~~
~~11/2~~	~~Prepare RASMAG template letter for use by RMAs in resolving difficulties with States. Such a letter would specify that the request has been made on behalf of RASMAG which has specific empowerment from APANPIRG. RASMAG/11 paragraph 2.8 refers.~~	~~RASMAG/13~~	~~Asia/Pacific RMAs, Secretariat~~	~~Open~~ Completed	~~RMAs to work by correspondence and present a draft template letter to RASMAG/13.~~
~~12/1~~	~~The Chairman to develop proposed wording for the RVSM Manual (Doc 9574) as detailed in para 2.4 of RASMAG/12 report and to circulate the material to the RASMAG members for review prior to the end of March 2010. The Chairman to ensure that the wording was included in the revised draft to be presented to SASP in May 2010.~~	~~31 March 2010~~	~~Chairman~~	~~Open~~ Completed	~~Australia presented the draft amendment to RASMAG/12. Experience of Western Pacific/South China Sea (WPAC/SCS) RVSM Scrutiny Group could be included.~~

ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
~~12/2~~	~~Initial analysis of LTHM infrastructure developed at RASMAG/12 detailed in para 2.15 of the report, should be reviewed by each RMA and State represented at RASMAG to consider further details in the interim before RASMAG/13. Additionally each of the RMAs to develop an analysis of the States for which they are responsible assuming that the proposed monitoring systems were in place. The analysis should determine the aircraft numbers and types that would be monitored by those systems. The data is to be presented in tables similar to those used by Australia in WP/20 at RASMAG/12. The data should be collected, analysed and forwarded to MAAR by end of April 2010, and thereafter reported by States to RASMAG/13.~~	~~1/ End of April 2010~~ ~~2/ RASMAG/13~~	~~All RMAs~~	~~Open~~ Completed	~~APANPIRG/20 (September 2009, Bangkok) was of view that more information was needed on which to base any decision and agreed that RASMAG would be tasked.~~
~~12/3~~	~~Expand coordination with FANS Implementation/Interoperability Teams (FIT) and/or Central Reporting Agencies (CRA) to obtain updated information on data link system performance~~	~~RASMAG/13~~	~~Regional Office~~	~~Open~~ Completed	~~Regional Office will send a State letter to Chairpersons of FIT and/or CRAs to have the holistic view of the data link application problems~~
12/4	Provide analysis of AIDC implementation and the effect of those implementations of the level of Category E LHD reports.	~~RASMAG/13~~ Ongoing	Asia/Pacific RMAs	Open	Japan captured and analysed data in relation to implementation of AIDC. RMAs will attempt to show Category E LHD performance before and after implementation of AIDC.
~~12/5~~	~~EMA Manual to be amended by Appendix D PROPOSED APPROVALS DATABASE RECORD FORMAT to the RASMAG/12 report.~~	~~RASMAG/13~~	~~Secretary~~	~~Open~~ Completed	~~Para 5.4 of the RASMAG/12 report~~
~~12/6~~	~~Review the proposal contained in WP/2 of RASMAG/12 and bring comments on the proposal to RASMAG/13 for further consideration.~~	~~RASMAG/13~~	~~ALL~~	~~Open~~ Completed	~~RASMAG/12 was presented by New Zealand on a common approvals database.~~
~~12/7~~	~~Coordinate the proposal to use Field 18 of the flight plan on a regional basis to identify an aircraft's PBN approvals, to the Flight Plan & ATS Message Task Force and to the ATM/AIS/SAR Sub-Group~~	~~February 2010~~	~~Secretary and Singapore~~	~~Open~~ Completed	~~RASMAG/12 Report para 5.12~~

ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
~~12/8~~	~~State letter to be sent from Regional Office to China requesting them to provide China RMA with the neeessary support for the establishment of a ground-based monitoring system.~~	~~Following coordination of draft letter~~	~~Secretary and China RMA~~	~~Open~~ Completed	~~RASMAG/12 report para 5.20~~
12/9	Continue joint research activity to explore ADS-B derived geometric height as a data source for aircraft height-keeping performance monitoring	RASMAG/13	Australia and United States	Open	
13/1	Coordinate the additional wording at para 2.3 of the RASMAG/13 report to the SASP at its next meeting in November 2010, for inclusion in Doc 9574	November 2010	Chairman	Open	
13/2	Amend the EMA Handbook to include the adopted proposed changes in **Appendix XX** to RASMAG/13 report	RASMAG/14	Secretary	Open	
13/3	RMAs review and amend their F2/F3 forms to align with Appendix XX and YY to RASMAG/13 Report	RASMAG/14	All RMAs	Open	
13/4	The Secretariat to convey the concerns and views expressed by RASMAG at para 2.23 of RASMAG/13 Report to ATM/AIS/SAR/SG and FIT-SEA.	RASMAG/14	Secretary	Open	
13/5	The Secretariat to update the LTHM impact statement to incorporate the revised MMR agreed at RMACG/5 and endorsed by RASMAG.	APANPIRG/21	Secretary	Open	
13/6	The Secretary write State letter advising the decision by RASMAG to use the MMR agreed by RMACG/5 as the basis for all long term height monitoring for Asia/Pac.	Oct 2010	Secretary	Open	
13/7	RMAs review the monitoring burden based on the revised MMR by 30 August 2010.	30 Aug 2010	All RMAs	Open	