



Agenda Item 2: Central Reporting Agency Reports

FIT-ASIA CENTRAL REPORTING AGENCY (CRA) PROBLEM REPORT BRIEFING

(Presented by the FIT-Asia CRA)

SUMMARY

This paper presents information describing the investigation and disposition of submitted Air Traffic Services (ATS) data link problem reports (PRs) that are relevant to FIT-Asia.

1. INTRODUCTION

- 1.1 ATS data link stakeholders may submit PRs via the www.fans-cra.com website.
 - a) Airways Corporation of New Zealand (ACNZ) graciously hosts and maintains the website.
 - b) The website is used by multiple organizations, namely FIT-Asia, the Informal South Pacific ATS Coordinating Group (ISPACG) FIT, the Informal Pacific Air Traffic Control (ATC) Coordinating Group (IPACG) FIT, and the North Atlantic (NAT) Technology and Interoperability Group (TIG).
- 1.2 Between preparation of the FIT-Asia/12 PR briefing in July 2022 and preparation of this PR briefing in May 2023, the FIT-Asia CRA received 19 new PRs. For comparison, the FIT-Asia/12 PR briefing indicated that the FIT-Asia CRA received 16 new PRs.
- 1.3 Figure 1 illustrates the number of PRs that the FIT-Asia CRA received per calendar year starting in 2016. The dotted line and associated number in the figure represent a linear projection of the number of PRs that the FIT-Asia CRA will receive in 2023.

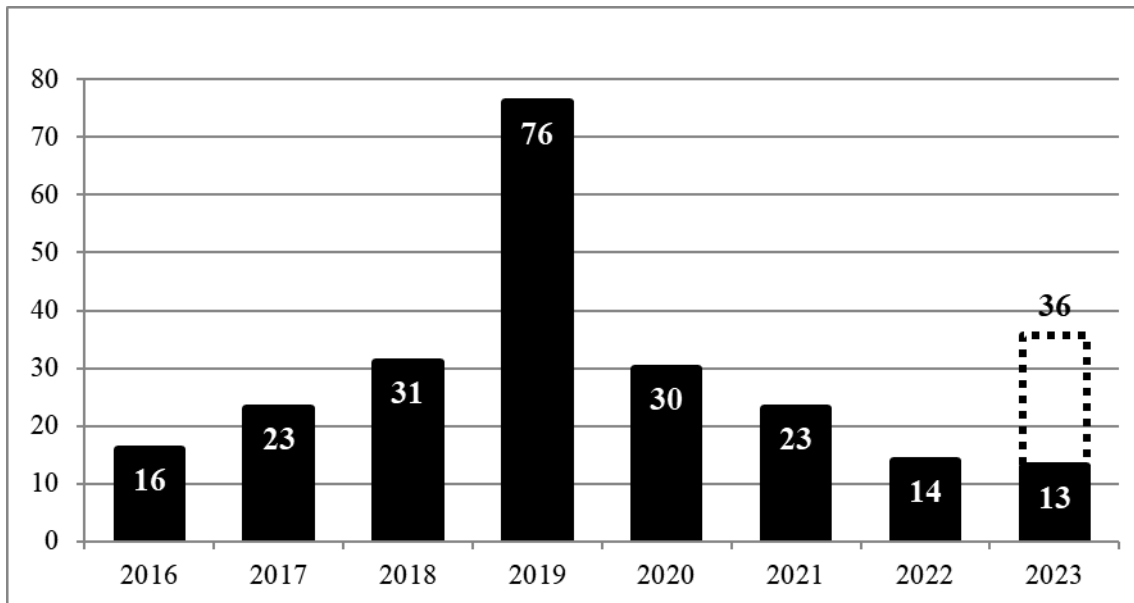


Figure 1: FIT-Asia PRs Per Year

1.4 PR status definitions include the following:

- **Raised:** The PR originator submitted the PR but the CRA has not yet processed it.
- **Active:** The CRA processed the PR and assigned it for investigation.
- **Open:** The CRA completed the PR investigation but some form of corrective action is required before the CRA can close it.
- **Open – Fix Available:** The appropriate stakeholder implemented corrective action and a fix is available for installation.
- **Closed As Duplicate:** The CRA closed the PR because it is already tracking the same problem with another PR.
- **Closed:** The appropriate stakeholder implemented corrective action.
- **Closed – Monitoring:** The CRA closed the PR because it cannot determine the corrective action. The CRA will monitor future PRs for any recurrences of the problem.

1.5 PR type definitions include the following:

- **TBA:** To be assigned.
- **Air – Procedural:** Flight crew issue.
- **Air – Technical:** Avionics issue.
- **Ground – Procedural:** Controller issue.
- **Ground – Technical:** ATS unit system issue.
- **Network:** Communication service provider or SATCOM service provider issue.
- **Multiple:** Multiple types of issues.
- **None:** Report is not a problem.

2. DISCUSSION

2.1 The FIT-Asia CRA updated the status or progress of the following old PRs that are relevant to FIT-Asia.

a) 3341-CJ, Closed – Monitoring / TBA. BOBASMA reported that Chennai was unable to establish a CPDLC connection with a Lufthansa Airbus A340. Airbus was unable to obtain the avionics logs for this event before they were overwritten and therefore could not determine the cause of this PR.

b) The CRA notes that some avionics software updates for Boeing aircraft have become significantly delayed due to new cybersecurity requirements for certification. While Boeing expects 757/767 Pegasus I BP11 software (which will resolve PRs 1516-GS and 2123-GS) to become available in June 2023, it does not expect 747 NG FMC BP4.1 (which will resolve PRs 2892-KS, 3119-MM, and 3251-GM) to become available until Q2 2024 and 777 AIMS BPV18 (which will resolve PRs 2292-SN, 2821-SH, and 3090-SH and also implement the ACARS Routing Airborne Time 1 [RAT1] function for improved time performance for PBCS) to become available until Q3 2024.

2.2 The FIT-Asia CRA received the following significant new PRs that are relevant to FIT-Asia.

a) 3416-MM, 3417-MM, and 3418-MM; Closed / Multiple. CAA Singapore reported that CPDLC messages and ADS-C reports via the IGW1 (Iridium SATCOM via SITA) and IG1 (Iridium SATCOM via ARINC) paths did not meet the respective RCP240 95% transaction time and RSP180 95% delivery time requirements during the period from April to June 2022. Based on examination of several specific cases, the CRA determined that the poor time performance was generally caused by the time required by aircraft to transition from using VHF to using Iridium SATCOM while crossing the gap in VHF datalink coverage across the South China Sea. In other words, this PR occurred not due to poor Iridium SATCOM performance but rather due to limited VHF datalink coverage in the South China Sea and the general aircraft preference to use VHF before SATCOM due to cost considerations. The CRA encourages aircraft operators to install ACARS avionics software that implements the RAT1 function as the software becomes available, considering that this function is specifically designed to ensure that aircraft meet RCP240 and RSP180 time requirements during transitions from VHF to SATCOM.

b) 3419-MM, Active / Multiple. CAA Singapore reported that a Boeing 777 did not meet the RSP180 95% delivery time requirement during the period from April to June 2022.

i) PBCS data and CSP log analysis indicates that the poor ADS-C report delivery time performance occurred due to limited VHF datalink coverage in the South China Sea area (including in the area between West Malaysia and East Malaysia where the NTX ground stations on Natuna Island previously provided coverage), specifically due to the time necessary for the avionics to transition from using VHF to using SATCOM when the aircraft was operating on the edge of VHF datalink coverage to the northeast of Singapore. The CRA also notes that the ADS-C report delivery time performance by this aircraft in the Oakland Oceanic and Anchorage Oceanic FIRs during the period from July to December 2021 was excellent and further that 777 AIMS-2 BPV18 software will implement the ACARS RAT1 function which is specifically designed to ensure that aircraft meet RCP240 and RSP180 time requirements during transitions from VHF to SATCOM.

ii) Nevertheless, PBCS data and CSP log analysis also indicates apparent delays to ADS-C reports that the VCS ground station operated by AEROTHAI received, specifically that on 15 May 2022 the ground station did not send ACARS acknowledgement uplinks to the aircraft in response to ADS-C report downlinks that it received and also that ADS-C report downlinks that the ground station received were not sent to CAA Singapore. The CRA assigned ARINC (which is affiliated with AEROTHAI) to investigate this aspect of the PR.

iii) Thanks to assistance from Airways New Zealand, Figure 2 below depicts the ADS-C report positions and associated delivery times (green for times less than 90 seconds, yellow for times from 90 seconds to 180 seconds, and red for times greater than 180 seconds) along with nominal VHF datalink coverage. As the figure shows, the delayed ADS-C reports occurred on the edges or outside of VHF datalink coverage, including where the NTX ground stations previously provided coverage.

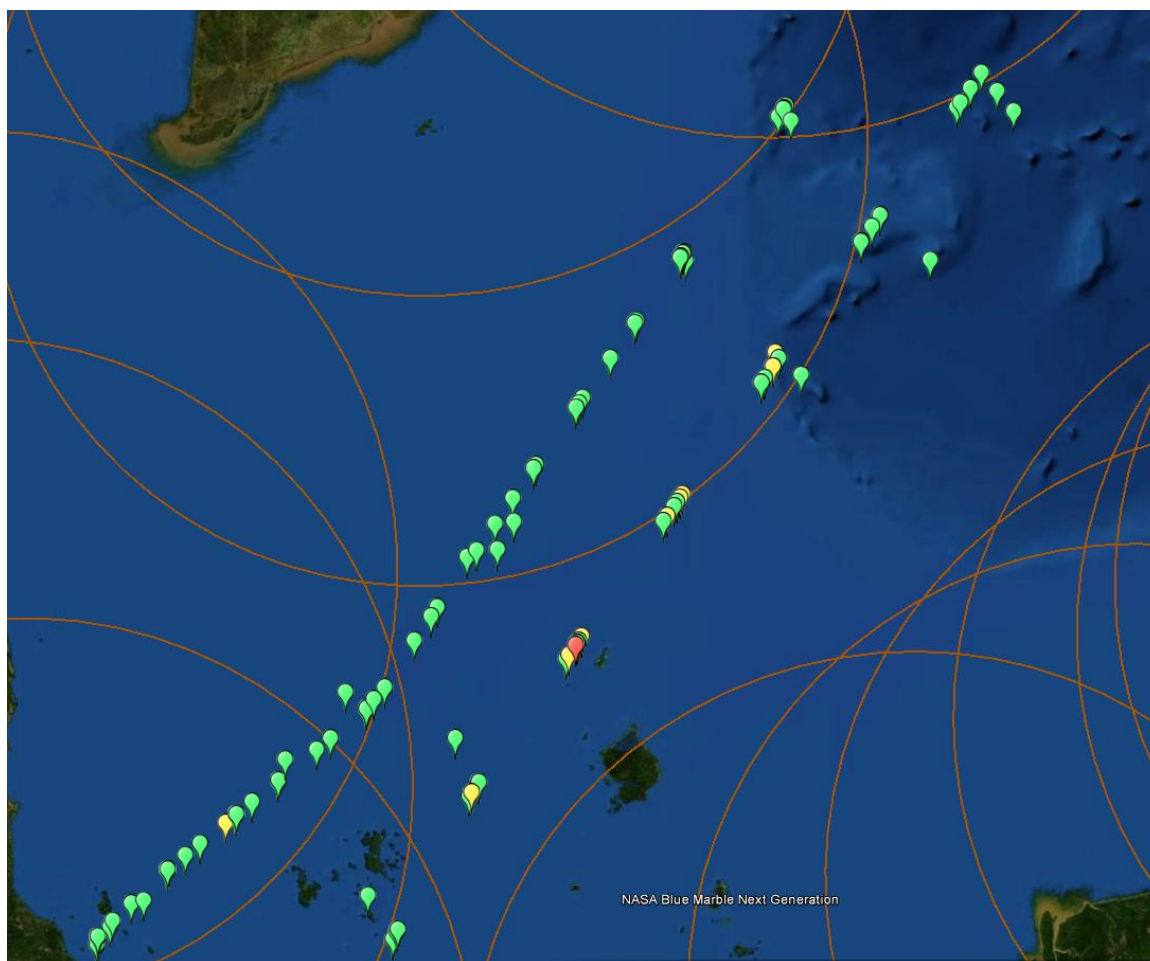


Figure 2: PR 3419-MM ADS-C Reports

c) 3420-MM, Active / Air – Technical. CAA Singapore reported that a Boeing 747 did not meet the RSP180 95% delivery time requirement during the period from April to June 2022. Based on available PBCS data and CSP logs (although CSP logs were no longer available for the period of the worst performance), Boeing believes that there was an avionics interface problem between the SATCOM avionics (SDU) and the ACARS avionics (CMU) on the aircraft. This problem caused the ACARS avionics to retransmit many ACARS downlink messages (including ADS-C reports) with a resulting degradation

of ADS-C report delivery time performance because the ACARS avionics evidently did not receive the ACARS acknowledgement uplink messages from the SATCOM avionics and accordingly did not know that the downlink messages were successfully delivered. The CRA assigned this PR to the aircraft operator to investigate further, possibly via maintenance actions on the Iridium SATCOM system. The CRA also notes that the ADS-C report delivery time performance by this aircraft in the Oakland Oceanic FIR during the period from July to December 2021 (when the aircraft had an Inmarsat SATCOM system installed before the aircraft operator replaced it with an Iridium SATCOM system) was excellent.

d) 3421-MM, Closed as Duplicate / Multiple. CAA Singapore reported that a Boeing 777 did not meet the RSP180 95% delivery time requirement during the period from April to June 2022.

i) The CRA could not fully investigate this PR because the dates of poor performance occurred too long before the PR was submitted for relevant CSP and avionics logs to be available. The PBCS data that CAA Singapore provided did indicate, however, that the poor performance occurred due to the time necessary for the avionics to transition from using VHF to using SATCOM when the airplane was operating on the edge of VHF datalink coverage to the northeast of Singapore where the NTX ground stations previously provided coverage. The CRA accordingly closed this PR as a duplicate of PR 3074-MM.

ii) The CRA also notes that the ADS-C report delivery time performance by this aircraft in the Oakland Oceanic and Anchorage Oceanic FIRs during the period from July to December 2021 was excellent and further that 777 AIMS-2 BPV18 software will implement the ACARS RAT1 function which is specifically designed to ensure that aircraft meet RCP240 and RSP180 time requirements during transitions from VHF to SATCOM.

iii) Thanks to assistance from Airways New Zealand, Figure 3 below depicts the ADS-C report positions and associated delivery times (green for times less than 90 seconds, yellow for times from 90 seconds to 180 seconds, and red for times greater than 180 seconds) along with nominal VHF datalink coverage. As the figure shows, the delayed ADS-C reports occurred on the edges or outside of VHF datalink coverage, including where the NTX ground stations previously provided coverage.

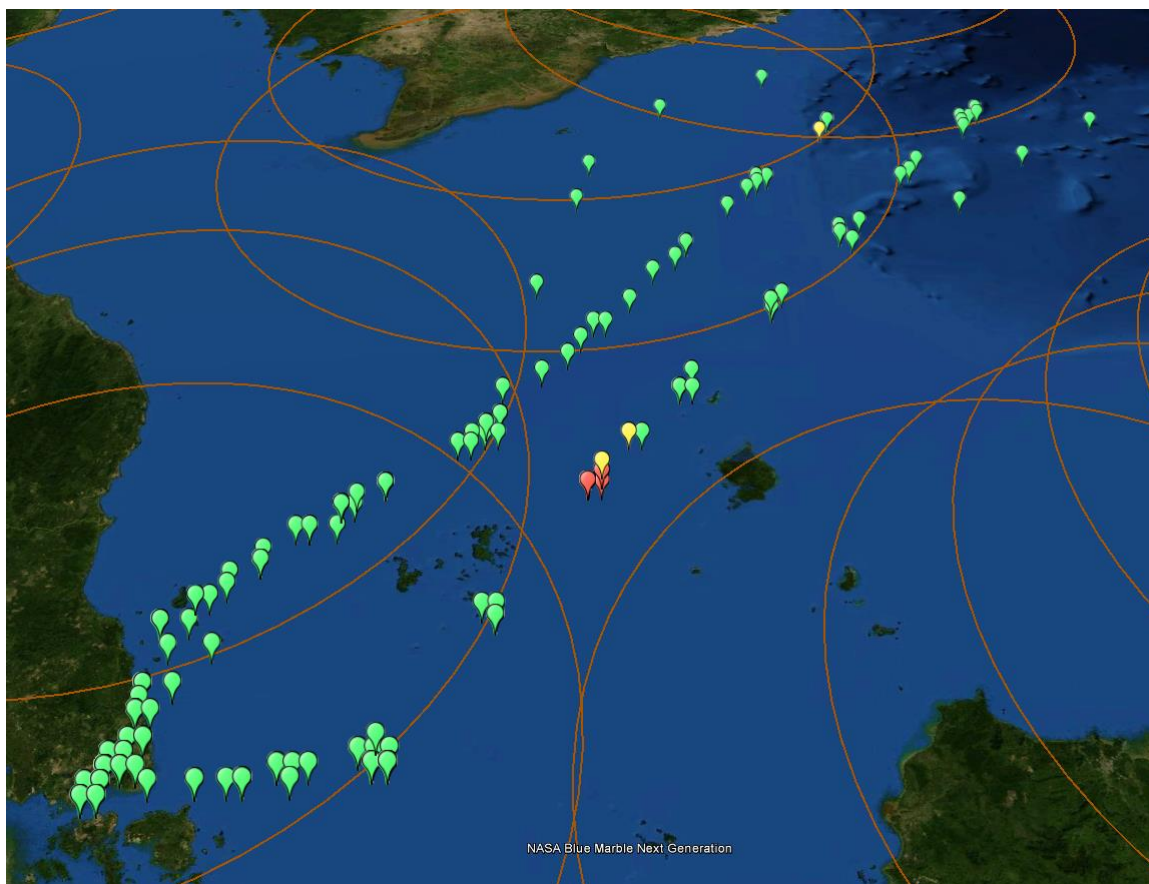


Figure 3: PR 3421-MM ADS-C Reports

e) 3497-NI, Active / TBA. AirAsia X reported that CAA Singapore found one of its Airbus A330 aircraft to be PBCS non-compliant from December 2022 to February 2023. The CRA assigned this PR to Airbus for investigation and requested that CAA Singapore provide the associated PBCS data to Airbus.

f) 3498-RA, 3499-RA, 3500-RA, and 3501-NI; Closed as Duplicate / Multiple. The CRA received four PRs from CAA Singapore regarding PBCS non-compliance from November 2022 to January 2023 for ADS-C reports from four Boeing 777 aircraft. CSP message log analysis shows that the delayed reports were primarily due to VHF to SATCOM media transitions as the aircraft operated on the edge of limited VHF datalink coverage from ground stations around the South China Sea, attempting and failing to deliver messages through the weak VHF link before routing the message through SATCOM after an extended period of time. Boeing recommends that aircraft operators install 777 AIMS-2 BPV18 software when it becomes available, which will include the configurable ACARS RAT1 function that is fully expected to minimize VHF to SATCOM transition delays. Boeing also observed that 1) media advisory messages are being sent before queued reports, and 2) queued reports are occasionally being duplicated when a new link is established. Both of these two issues further contributed to delayed report delivery times and are known software issues that Boeing plans to fix in a future software release. Additionally, the four aircraft performed well in the Pacific area during the July-December 2022 period. The CRA closed these PRs as duplicates of PR 3074-MM for poor ADS-C report delivery time performance in the South China Sea area.

g) 3502-MM, 3503-MM, and 3504-MM; Closed / Multiple. CAA Singapore reported that ADS-C reports via the IG1 (Iridium SATCOM via ARINC), IGW1 (Iridium SATCOM

via SITA), and XXP (Inmarsat SATCOM Asia-Pacific satellite via ARINC) paths did not meet the RSP180 95% delivery time requirement during the period from November 2022 to January 2023. Based on guidance contained in ICAO NAT Doc 011, *PBCS Monitoring and Reporting Guidance*, 1st Edition Amendment 2, which will be incorporated into ICAO Doc 9869, *Performance-based Communication and Surveillance (PBCS) Manual*, 3rd Edition, the CRA understands that PBCS monitoring should be performed and reported against individual aircraft (airframes), not against ground station paths. Additionally, based on investigation of similar previous PRs (such as PRs 3074-MM, 3178-MM, 3242-MM, and 3416-MM) the CRA does not believe that it makes technical sense to investigate PRs against specific ground station paths because the causes of the poor performance – particularly the time required by the aircraft to transition from using VHF to using SATCOM per the ACARS protocols in areas with limited VHF datalink coverage such as the South China Sea – are infrequently due to the reported path itself.

h) 3522-MM, Closed as Duplicate / Multiple. CAA Malaysia reported that ADS-C reports via the IGW1 (Iridium SATCOM via SITA) path did not meet the RSP180 95% delivery time requirement during the periods from January to June 2022 and from July to December 2022, although the CRA could not fully investigate this PR because the associated PBCS data was not available. Based on previous similar PRs, however, the CRA expects that the poor delivery time performance via IGW1 was due to limited VHF datalink coverage in the South China Sea. In such areas, ADS-C reports and other downlink messages can be delayed because of the time required by the aircraft to attempt but fail to deliver the messages via VHF as the preferred link when operating in areas of poor VHF datalink coverage and then revert to delivering the messages via SATCOM, in this case IGW1. The CRA believes that the most effective solution to this problem will be widespread avionics implementation of the ACARS RAT1 function, which is currently in progress. The CRA also notes that decommissioning of the NTX VHF ground stations operated by SITA and ARINC at the request of the Indonesian government is another cause because it created a gap in VHF datalink coverage between East Malaysia and West Malaysia. The CRA has closed this PR as a duplicate of PR 3074-MM.

2.3 The FIT-Asia CRA is aware of the following significant new PRs that occurred in other areas around the world but which are relevant to FIT-Asia.

a) 3347-MM, 3371-MM, 3449-RA, and 3481-RA; Open / Ground – Technical. The North Atlantic (NAT) Data Link Monitoring Agency (DLMA) received several PRs caused by ATS providers incorrectly considering a dM40 ASSIGNED ROUTE [route clearance] downlink containing a legal “-” (hyphen) character in the approach procedure name parameter (e.g., “ILS-Y”) to be an error. ATS providers may wish to examine how frequently they receive procedure name parameters and consider confirming that their systems accept all legal characters, which per RTCA DO-258A / EUROCAE ED-100A for a departure, arrival, or approach procedure name parameter is the “IA5String” (ASCII) character set defined in the ITU T.50 standard available at <https://www.itu.int/rec/T-REC-T.50-199209-1/>.

b) 3411-CJ, 3455-CJ, 3470-RA, and 3471-MM; Closed / Ground – Technical. The NAT DLMA received several PRs for uM79 CLEARED TO [position] VIA [route clearance] uplinks that when loaded caused the avionics to remove the arrival, arrival transition, and/or approach from the route. Boeing confirmed that inclusion of the unnecessary destination airport parameter in a uM79 uplink causes the avionics to remove the arrival, arrival transition, and/or approach from the modified route because the avionics reload the destination airport, even if the destination airport in the uplink is the same as the destination

airport in the active route. Boeing accordingly recommends that ATS providers refrain from including the destination airport parameter in a uM79 uplink.

c) The FIT-Asia CRA is aware of multiple recent PRs in various areas around the world that were caused by problems with aftermarket retrofit avionics that aircraft operators installed without aircraft manufacturer involvement. In these cases the responsibility to investigate and resolve the problems is primarily on the aircraft operator and its avionics supplier, although the aircraft manufacturer will provide support as appropriate.

2.4 The FIT-Asia CRA received the following less-significant new PRs that are relevant to FIT-Asia.

a) 3505-MM, Closed / TBA. CAA Singapore reported that a particular aircraft operator's B38M aircraft type did not meet the RCP240 95% and 99.9% transaction time requirements during the period from January to June 2022. CAA Singapore could not provide the associated PBCS data due to technical constraint, however.

b) 3506-MM, Closed / TBA. CAA Singapore reported that a particular aircraft operator's B38M aircraft type did not meet the RCP240 95% and 99.9% transaction time requirements during the period from July to December 2022. CAA Singapore could not provide the associated PBCS data due to technical constraint, however.

c) 3507-MM, Closed / TBA. CAA Singapore reported that a particular aircraft operator's G280 aircraft type did not meet the RCP240 95% and 99.9% transaction time requirements during the period from July to December 2022. CAA Singapore could not provide the associated PBCS data due to technical constraint, however.

d) 3508-MM, Closed / TBA. CAA Singapore reported that a particular aircraft operator's GLF5 aircraft type did not meet the RSP180 95% and 99.9% delivery time requirements during the period from July to December 2022. CAA Singapore could not provide the associated PBCS data due to technical constraint, however.

2.5 The FIT-Asia CRA additionally notes that since the start of 2023 no contract is in place for its services in the Bay of Bengal and Arabian Sea areas. Accordingly, the CRA closed six new PRs which occurred in those areas without investigating them. Given that the PRs all involved Boeing aircraft, however, the CRA recommended to the PR originator (one particular aircraft operator) that it report the problems directly to Boeing for investigation.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) promote expeditious resolution of Active and Open PRs.

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