PR Review

Presented by
J.F.BOUSQUIE
Flight Test Engineer

AIRBUS

South Pacific updated PRs

PR 1960 - Downlinks not received - A332

Issue:

Although a CPDLC Connection had been established with the aircraft, no CPDLC downlinks could be received.

Analysis:

Communication issues (poor HF and satcom faults) encountered

Analysis also highlighted that some ATC messages received by FANS onboard system (acknowledged by the router) were not answered.

Scenario could be identical to PR 2153 but assumptions cannot be confirmed without internal traces.

TO BE MONITORED

AIRBUS

PR 2159 – Incorrect ADS-C Estimate – A332

Issue:

An ADS-C report received from the aircraft resulted in a grossly erroneous estimate (8-10 minutes error) being held by ATC for the next waypoint.

Issue detected whereas A/C was operating on a weather deviation.

Analysis:

- Air/ground traces confirm the erroneous ETG estimate given by the ADS report.

- Issue related to bad FMS prediction computations but no root cause identified

- No further possible investigation because of a lack of operational data (FMS internal data not retrieved from the airline, very short timeframe availability for these information) .

- However similar issues encountered last week and winds insertion in the FMS as a root cause hypothesis. A/L contacted for clarifications.

TO BE MONITORED

AIRBUS

PR 1912- Uplinked CPDLC route clearance - No LOAD prompt or error message - A332

Issue:

No LOAD prompt or error message displayed on-board upon reception of a CPDLC route clearance.

Analysis:

No traces available for investigation.

PROPOSITION TO CLOSE THE PR

AIRBUS

South Pacific
New PRs

AIRBUS

NEW PRs

- Traces not received yet:
  - PR 2391 - Incorrect predicted route next and next+1 position in on-demand response
  - PR 2393: Erroneous ADS-C estimates for A332
  - PR 2394: Erroneous ADS-C estimates for A332

- Traces received but PR still under investigation:
  - PR 2371 – Incorrect estimate in ADS-C waypoint event

PR 2201 : A380 – Unexplained ADS-C Emergency Received

Issue:

Air Services Australia reported reception of ADS-C Emergency reports whereas the crew stated they had not selected the emergency mode.

ADS-C "normal" reports were received again several minutes later.

Analysis:

- Air/ground traces do not highlight any on-board ATC application misbehavior.

- Pilot error is suspected: the crew is assumed to have untimely activated the ADS-C Emergency mode and set if off afterwards.

TO BE CLOSED

AIRBUS

PR 2207: A330 - Unrecognized Message Ref Number

Issue:

Untimely reception of a CPDLC Error Message after transmission of an uplink response with a MRN matching MIN of previous downlink message

Analysis:

- The uplink message was transmitted via VHF first. As no ACARS acknowledgement was received from the aircraft, it was re-transmitted via SATCOM afterwards.

- In spite of no ACARS ack received on ground, the aircraft is assumed to have received the uplink message via VHF.
  When the message was received via Satcom, it was rejected as the previous CPDLC dialog had been closed following the uplink received on VHF.

TO BE CLOSED

AIRBUS

PR 2181 : A330 - Unusual Loss of CPDLC and ADS-C

Issue:

Untimely CPDLC and ADS-C disconnections occurred whereas connections were established with Brisbane. The same issue occurred again after CPDLC/ADS-C connections were re-established.

Auckland Oceanic advised afterwards that they could not establish any CPDLC connection.

Analysis:

- Disconnection messages result from on-board elf-resets of the software FANS A+ application

- When maximum allowed reset number was reached, the FANS A+ application stopped and did not accept connection request from Auckland

- Untimely reset experienced with ATSU CLR7.2 standard is fixed in CLR7.4

> Free of charge retrofit from CLR7.2 to CLR7.4 standard
> Recommendation already issued to airlines to protect against reset
> (empty Message record after flight)

AIRBUS

PR 2270: A380 - Assigned route missing data

Issue:

When aircraft was queried for assigned route, the response downlink indicated route ended at fix KEBAB, with all the remaining route points to Sydney missing.

Analysis:

- Tests based on air/ground traces and including use of A/C navigation database were performed but the issue could not be reproduced.

- No further investigation can be performed due to missing FMS internal data

TO BE MONITORED

AIRBUS

PR 2336/2338: A330 - Unable to Establish an ADS Contract

Issue:

Air Services Australia reported several occurrences where ADS-C contracts could not be established: contract requests were properly received (MAS received on ground) but the aircraft sent no subsequent ACK or report.

Analysis:

- All impacted A/C fitted with FANS A product

- Issue identical to PR 2284: Following an automatic on-board FANS A avionics reset, ADS-C exchanges could no longer be performed. However, a manual reset allowed to recover the ADS-C function

  ➔ Capability to recover ADS-C after such an auto-reset is fixed in FANS A+ product

- ➔ Latest FANS A+ ATSU (CSB/CLR7) however fix known applicative resets

> TO BE CLOSED (REDUNDANT WITH PR 2284)

AIRBUS

PR closed since last FIT meeting

- PR 1902 - No WCE downlinked following change to Next + 1 - A332

  (conclusion from last FIT meeting: aircraft behaviour as per design; implementation change under study)

- PR 2124 - CPDLC error messages received in response to an EXPECT uplink - A380

  (conclusion from last FIT meeting: aircraft behavior as per GOLD recommendation)

- PR 2156 – Aircraft received CPDLC message not sent by ATC – A332

  (no traces received for investigation)

- PR 2214 – Inconsistent estimates received in ADS-C reports from A332

  (issue not reproduced and no data for further investigation + identical to PR 1486)

AIRBUS

STATUS ON ADS-C ISSUES

AIRBUS

Introduction: Airbus FANS A+ fleet

FANS A operations have been available on A330/A340 Airbus fleet since 2000. It was then gradually introduced on the whole family

Optional on A320 family
  CSB4 (FANS A+) from 2004, CSB7 (FANS A+ DR) from 2011

Basic on A330/A340
  CLR3 (FANS A) from 2000, CLR4 (FANS A+) from 2005, CLR7 (FANS A+ DR) from 2011

Basic on A380
  CLA 4 (dual FANS A+B) since Q1 2015

Basic on A350
  CLV1 (dual FANS A+B) from EIS

Two significant issues have been reported so far on ADS-C

- Unexpected disconnections with code "No reason specified"

- Use of default values for some parameters in the Predicted Route reports

AIRBUS

ADS-C disconnections with "Reason Not Specified" (1/3)

What?

A significant number of occurrences of <u>ADS unintentional disconnections</u> over Reykjavik area has been reported since 2010.

Other occurrences have also been reported by different Airlines and ANSPs, in Asia, Australia and North Atlantic area on A330/A340 aircraft

=> ADS contracts are disconnected by the Aircraft with Reason « 00 », and as a consequence such contracts have to be re-established

AIRBUS

ADS-C disconnections with "Reason Not Specified" (2/3)

Why?

The analysis of all ADS-C disconnects event (all reason codes) revealed that 90% were normal disconnects and 10% were abnormal disconnects.

Deeper analysis was performed on these 10 % and two root causes were identified:

- Following an unexpected airborne reset, a Disconnect message with "no reason" specified was sent to all connected ATC centers

- Due to a CLR3 FANS A standard known issue, when an intentional (pilot action) disconnect was sent, the reason code was wrongly encoded (as 00) and therefore understood as reason not specified by the ATC centers

AIRBUS

ADS-C disconnections with "Reason Not Specified" (3/3)

Technical Status & way forward:

The wrong reason code issue identified on standard CLR3 (A330/340 family) has been corrected in CLR4/CSB4 (FANS A+).

The unexpected reset issue has been corrected in CLR7/CSB7

Following a 6 months monitoring of the CLR7.2 on SAS fleet in 2013, no further occurrence of the ADS-C disconnect issue was reported.
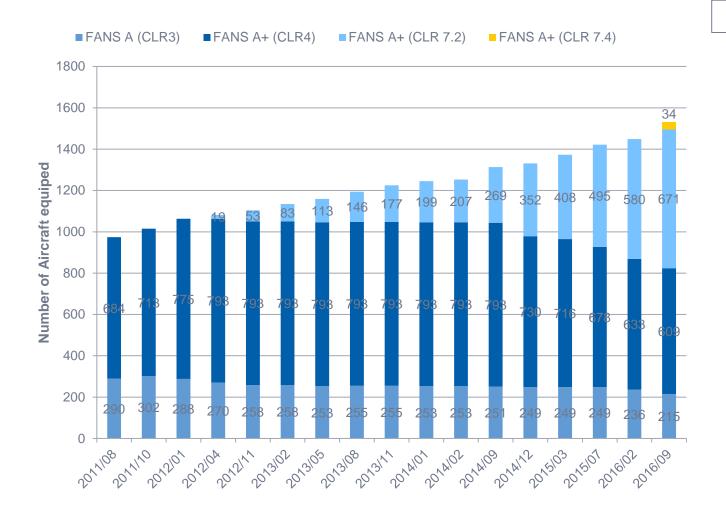
The problem is not identified on A380 and A350 products

AIRBUS

Airbus FANS equipage on A330/A340 aircraft

Sept 2016 Update

AIRBUS

ADS reports default values parameters (1/3)

What?

Several occurrences of ADS-C Predicted Route reports with default values for time and altitude instead of the real instantaneous values were reported.

Most of ANSPs are able to recognize the default values and ignore the report ("ADS-C Report Update missing").

Some ANSPs complain about erroneous data in the reports: reports with such default values differ from the expected ones when compared with the ground calculated flight plan.

In any case this can trigger alerts to the controller, and generates unnecessary new contract requests.

AIRBUS

ADS reports default values parameters (2/3)

<u>Why?</u>

Time and altitude parameters are provided by the FMS (Flight Management System). They may not be available for a short period if they are under computation. This happens mainly in case of flight plan modification by the crew.

By design, whatever the type of ADS-C contract (periodic, on-event or on-demand) the report is sent immediately upon the relevant trigger. If some parameters are not available, they are replaced by default values (as per ED-100A)

This design is common to all AIRBUS Aircraft families.

AIRBUS

ADS reports default values parameters (3/3)

Technical Status & way forward:

For A320 and A330/340 families, an improvement is implemented in the latest standard (CSB/CLR7.4 available since 2016):

When an event which may generate a report occurs, the ADS-C application will wait up to 30 sec to increase the probability to get all the required parameters.

This has been implemented only on on-event contracts (because a flight plan activation may trigger such reports).

This will be extended to all Contract types in further standards.

On A380/A350 this improvement will be implemented at the earliest opportunity.

AIRBUS

Erroneous ADS-C Predicted Route information

- Several PRs under investigation show:

  ➢ Inconsistent time estimate for next waypoint

  ➢ Inconsistent position information for next / next+1 waypoints (e.g. missing waypoints in comparaison with those given by CPDLC DM#24)

- Different possible root causes (pilot action, possible system anomaly) - Investigation to be carried out on case by case basis

  - To support investigation, ATC cooperation is needed
    ➔ Short time frame to retrieve internal FMS system data from airlines

  - In case of live occurrence, report issue as soon as possible to Airbus
    (+ 33 6 8383 8812)
    philippe.berthomieu@airbus.com/marine.glimois@airbus.com
    jean-francois.bousquie@airbus.com/clement.selles@airbus.com)

AIRBUS