

**Thirty Eighth Meeting of the
Informal South Pacific ATS Coordinating Group
(ISPACG/38)**

**Santiago, Chile
04-05 June 2024**

Agenda Item 8: *Information Papers*

AIRBUS FEEDBACK ON RAT1 IMPLEMENTATION ON AIRBUS PRODUCTS

Presented by: *Airbus*

SUMMARY

This paper aims at presenting some statistics and feedback on the timer RAT1 implementation on Airbus avionics.

Airbus Amber – Export Control Not Technical

1. INTRODUCTION

- 1.1 In the frame of the In-Service activities, Airbus received avionics internal traces from several Aircrafts equipped with FANS 1/A avionics that implement the RAT1 timer.
- 1.2 The internal traces from one of these Aircraft were used in order to assess the benefits of the RAT1 Timer on ATC communication performances.

2. DISCUSSION

- 2.1 The RAT1 Timer is intended to improve performance for FANS 1/A downlink messages during VHF-to-SATCOM transition areas by additionally attempting to send a message via SATCOM when attempts to send it via VHF have not been successful for 60 seconds.
- 2.2 The RAT1 Timer is currently implemented on the following Airbus avionics:
 - a) ATSU CSB/CLR 7.5 and CSB/CLR10.2.1 for Airbus A320/330 and 340 aircraft;
 - b) ACR S3 on A380 Aircraft;
 - c) ACR S4 on A350 Aircraft.

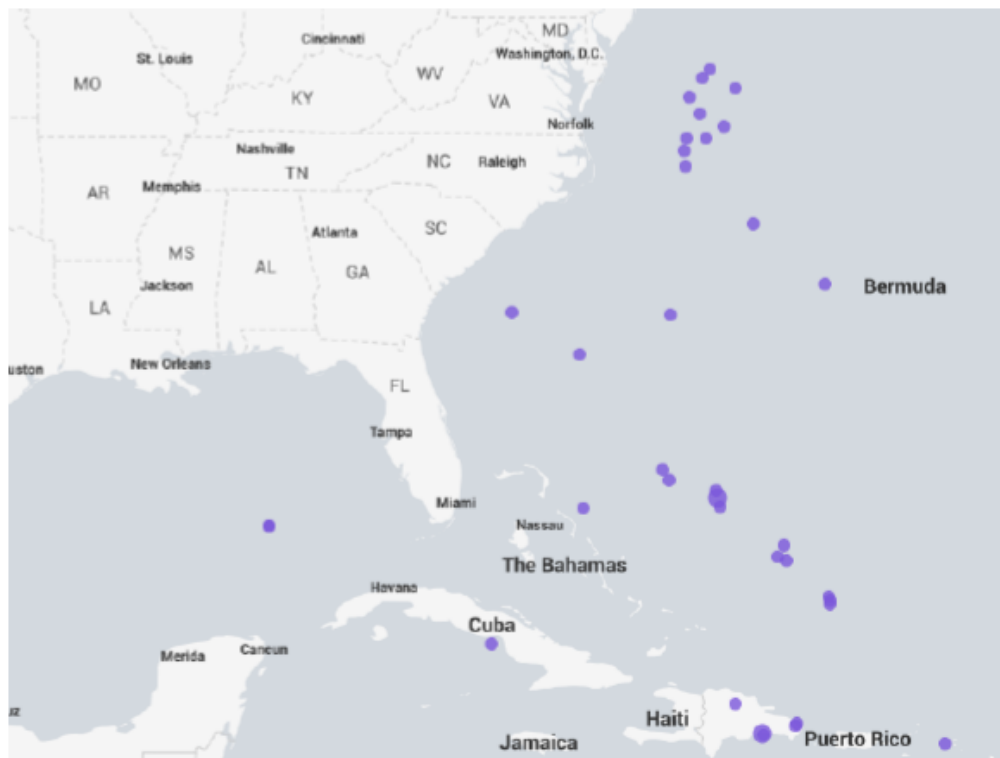
2.3 Please note the following elements about the figures that will be presented afterwards:

- a) The analyzed internal traces were all provided by the same operator;
- b) These traces were recorded during operations performed on A320 family aircraft:
 - i. equipped with a CSB7.5 ATSU for the figures related to RAT1 implementation
 - ii. equipped with a CSB9.4 ATSU Standard for the figures with no RAT1 implementation
- c) no internal traces could be retrieved from an aircraft flying in the PAC area with an avionic implementing the RAT1 Timer.

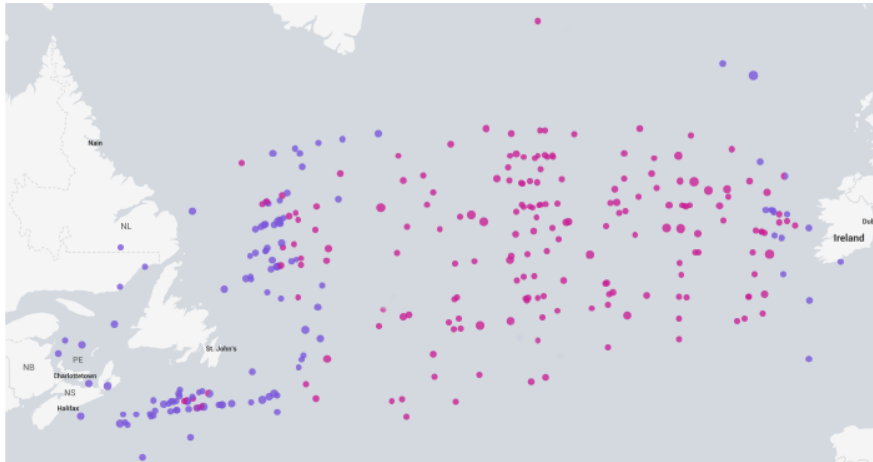
The aircraft fitted with an avionic implementing RAT1 was flying on the Eastern Coast of the USA. Nevertheless, Airbus should be able to retrieve data over the NAT HLA in the frame of the CEIS (Control Entry into Service) performed for the avionics ATSU CSB10.2.1

2.4 Avionic logs retrieved from a CSB7.5 ATSU Standard (with RAT1 implemented) show RAT1 timer expiration on 38 occasions (for approximately 8900 ATC – CPDLC + ADS-C - downlink messages sent while both VHF and Satcom were available at the beginning of the transaction) for 186 flights on a 3 months period.

The aircraft position when the RAT1 Timer expired is consistent with a VHF / Satcom transition area:



- 2.5 The time finally taken by the ATC downlink messages to be acknowledged by the Ground after RAT1 expiration is between 73s and 106s with an average value of 84s.
- 2.6 Some ATC downlink transmissions took more than 60s without RAT1 expiration. These occurrences are explained by the following reasons:
- a. Some ATC transmissions started while the VHF link was available. The VHF link was then seen as lost before RAT1 expiration and the ATC downlink message was sent using the Satcom but only when this link which was busy, became available
 - b. For other ATC transmissions, the Satcom link was temporarily lost while the ATC downlink was repeated on the VHF channel. As there was no alternate media to send the message, this one kept on being repeated over the VHF link even after 1 minute and until a ground acknowledgement was received.
- 2.7 For this aircraft, the ATC exchanges characteristics are as follows:
- a. Almost 8900 ATC downlink messages recorded in the logs when both VHF and Satcom were available.
 - b. 61 took more than 60 seconds to be sent to the ground (49 took more than 70s, around 0,5% of the total of ATC downlink messages)
 - c. The RAT1 Timer expired on 38 occasions
 - d. The average time for these ATC downlink transmissions concerned by the RAT1 Timer expiration is 86 s.
- 2.8 The avionic logs retrieved from a CSB9.4 ATSU Standard (without RAT1 implemented) on an aircraft flying in the NAT HLA area, show the following ATC downlink transmissions that took more than 60s (for 155 flights on 3 months period):
- In purple are the downlinks transmitted when both VHF and Satcom were available at the beginning of the transmission
 - In pink are the downlinks transmitted when the VHF is not available at the beginning of the transmission



2.9 For this Aircraft, the ATC exchanges characteristics are as follows:

- a. Almost 12500 ATC downlink messages (ADS-C + CPDLC) recorded in the logs.
- b. 765 took more than 60 seconds to be sent to the ground among which:
 - i. 197 took more than 60s while VHF and Satcom links were available at the beginning of the transmission (purple dots on the map above) => The RAT1 Timer may improve the transmission times for these messages
 - ii. 568 took more than 60s while the VHF link was not available at the beginning of the transmission (pink dots on the map above) => The RAT1 Timer will have no impact on these transmissions.

2.10 As a conclusion, the traces retrieved from an aircraft equipped with an avionic implementing the RAT1 Timer show that this timer was properly used to switch to a Satcom in transition areas, which certainly allowed improving the performances for these messages' transmission

2.11 Nevertheless, the study will be refined once more traces will be received and a comparison can be performed against the traces already available. These traces could allow determining the impact of the RAT1 Timer implementation to improve the time performance for RSP180 and RCP240.

3. ACTION BY THE MEETING

3.1 The meeting is invited to note the information provided.

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