

**Twenty-First Meeting of the Cross Polar Trans East Air Traffic Management Providers'
Work Group (CPWG/21)**

(Montreal, Canada, 17-20 May 2016)

**Agenda Item 8: Communications, Navigation, Surveillance (CNS) and Air Traffic Management
(ATM)**

B787 FANS Issues with Fast Responses - Embedded ACKs

(United Airlines)

SUMMARY

This paper presents information on On Boeing 787 airplanes, it has been observed that: An embedded ACARS (technical) acknowledgement to the FN_CON in the FN_AK, when this is part of address forwarding from one ATC Center to another can cause all ATS downlink traffic to be delayed about 10.5 minutes, after which the FN_CON is repeated, followed by any CPDLC or ADS-C downlink messages which were queued during that time. This issue has been observed on numerous occasions resulting in varied actions by ANSPs.

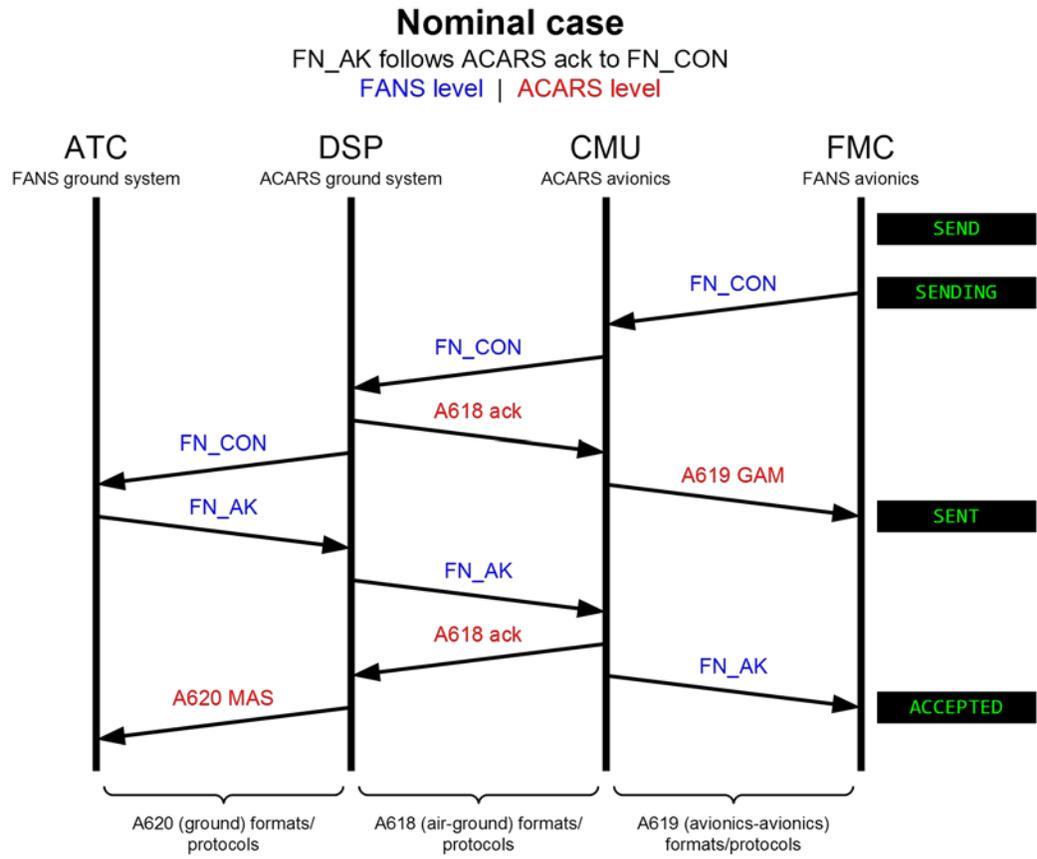
1 Introduction

- 1.1. The B787 embedded ACARS acknowledgement messages has caused some disruptions in ATC processes in Anchorage airspace, as well as others on a global basis affecting CPDLC and ADS-C data exchanges.
- 1.2. The intent of this paper is to bring ANSPs awareness to these issues and determine if any specific actions should be considered by operators and the ANSP experiencing the issue.

2 Discussion

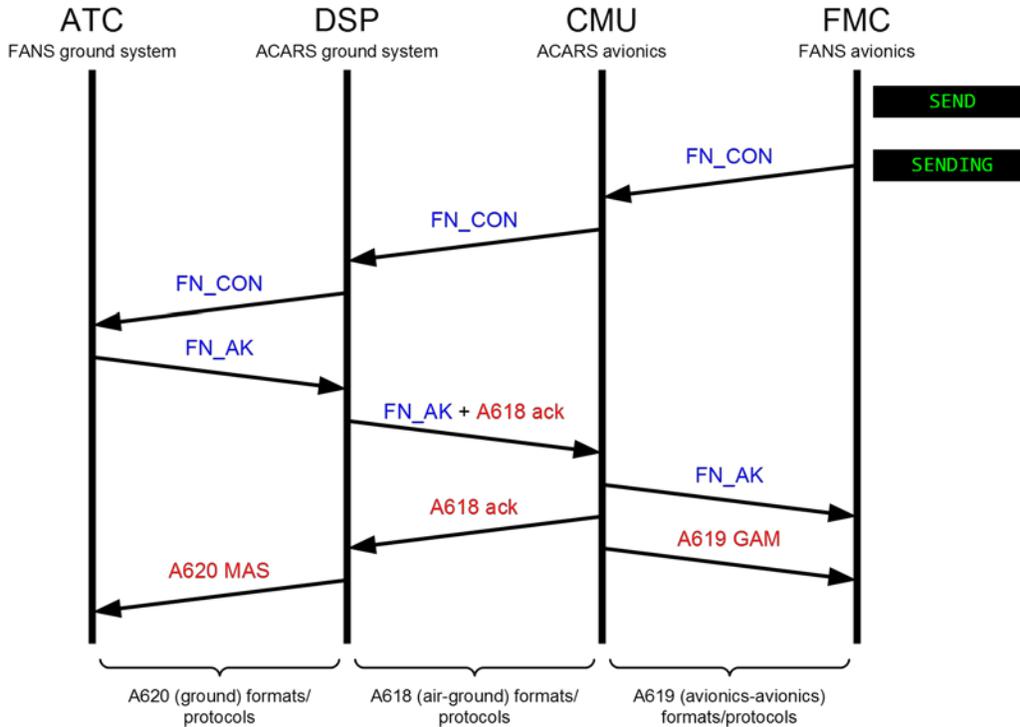
- 2.1. The ACARS protocols require that each block of a message (uplink or downlink) receive a technical acknowledgement from the receiving system, before the next block can be transmitted.
- 2.2. That technical acknowledgement can take the form of a General Response message (which just acknowledges the receipt of the block), or it can be embedded in a block that the receiving system wishes to send.
- 2.3. General Response messages are supported by all Datalink Service Providers (DSPs), but the embedded acknowledgements are not necessarily supported by all DSPs.
- 2.4. Embedded acknowledgements have been observed to have some issues in service.

2.5. On Boeing 757 and 767 airplanes, it has been observed that when the AFN Acknowledgement (FN_AK) uplink message contains an embedded ACARS (technical) acknowledgement for the corresponding AFN Contact (FN_CON) downlink message, then the CPDLC connection may fail to establish. When this occurs, the avionics responds to the CPDLC connect request (CR1) uplink with a DR1 containing dm64 with a center ID consisting of all spaces. This has been noted on a number of occasions with the FAA Departure Clearance (DCL) program.



Off-nominal case

ACARS ack to FN_CON embedded in FN_AK
 FANS level | ACARS level



- 2.6 On Boeing 737 airplanes, a similar situation occurs, but in this case, the CPDLC connect request is simply discarded, with no response.
- 2.7 Although Boeing is aware of a few cases where CPDLC connection establishment with 777 airplanes was delayed, the cause of delays does not appear to be embedded ACARS (technical) acknowledgements and is still under investigation. The 777 has the same problem as 787 with aborted CONTACT messages in Canada.
- 2.8 On Boeing 787 airplanes, it has been observed that:
1. An embedded ACARS (technical) acknowledgement to the FN_CON in the FN_AK, when this is part of address forwarding from one ATC Center to another can cause all ATS downlink traffic to be delayed about 10.5 minutes, after which the FN_CON is repeated, followed by any CPDLC or ADS-C downlink messages which were queued during that time. This has been seen to cause delays in ATSU's receiving ADS-C reports, leading to potential loss of separation.
 2. When a CPDLC end-service message contains an embedded ACARS (technical) acknowledgement to a WILCO downlink, the uplink that the WILCO responded to goes into an "aborted" state.

- 2.9 On the Boeing 787, at least, it has been observed that this behaviour mostly, if not exclusively, occurs when the airplane is using VHF, rather than SATCOM. ARINC does not use imbedded acks on SATCOM. Boeing (CRA) has requested the FAA for some statistical data on the number of times they've seen the "wait 10.5 minutes and repeat" scenario.
- 2.10 The Blockpoint version 4 (BPv4) software release for the Communication Management Function (CMF) on 787 airplanes is expected to fix the problems stated in this paper..
- 2.11 BPv4 is currently scheduled for certification later this year. Newly-built airplanes, starting in February 2017 will have it, and a Service Bulletin to allow operators to install it as a retrofit on previously delivered airplanes will likely be available sometime in the first quarter of 2017.

3 Recommendation

- 3.1. The Meeting is invited to note the information provided in this pape and is encouraged to discuss any specific actions by ANSPs or operators when such issues occur.