AERONAUTICAL TELECOMMUNICATIO NETWORK PANEL

Working Group-3

Rio de Janeiro, Brazil
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Agenda Item 4: Air-Ground Applications

ADS Emergency &/or Urgency Requirements

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SUMMARY

This working paper presents new requirements defined by ADSP over the past year to accommodate additional functionality for the ADS application.

1 Introduction

1.1 This working paper presents the requirements identified by the ADSP WG-A to provide functionality in the ADS application which indicates that an aircraft is in an Emergency and/or Urgency status.

1.2 The ADSP intends to forward these requirements at ADSP/5 in Sept. 1999. The information attached should be considered as draft until formally received by the Secretary of the ATNP from the Secretary of the ADSP.

2 Discussion

2.1 The operational requirement for this function was originally identified by IFALPA at the ADSP WGW in Dakar, Senegal in March 1996. As it was not sufficiently mature to be included at ADSP/4, WG-A began to work on the requirements for transmitting an ADS Emergency mode report containing information that the aircraft was being subjected to unlawful interference.

2.2 This work resulted in capturing the range of possibilities that exist in today's SSR systems, plus those that were captured in the development of the ADS-B application by RTCA & EUROCAE.

2.3   WG-A determined that the need for parity between the various forms of surveillance that could ultimately be presented to the controller via a surveillance fusion integration function, must be common and represent at least the level of existing surveillance capability in use today.

2.4   The result of this effect on the ADS application is contained in the attachment to this working paper.

2.5   The chances of having a surveillance fusion integration function prior to implementation of the existing ADS application in airspace other than Oceanic and Remote is unlikely. However, IFALPA has stated a strong requirement for this capability and several States are beginning to make surveillance architectures which will incorporate the surveillance information from multiple sources.

3   Recommendation

3.1   ATNP WG-3 is invited to consider the attached information in its future work program and to assess the impact of an enhancement to the existing ADS functionality on backward compatibility.

Attachment to ATNP WG-3/WP-13 Rev. 1

(paragraph numbers refer to the paragraphs to be modified in the ICAO Manual of
ATS Data Link Applications)

3.7   Establishment and Operation of Emergency and/or Urgency Mode

3.7.1   This function allows the avionics to initiate emergency and/or urgency mode either on instruction from the pilot or automatically. Emergency and/or urgency mode is entered between the aircraft and:

a)   all ground systems that currently have Periodic or Event contracts established with that aircraft,
b)   upon response to a Demand Contract request.

3.7.2   The emergency and/or urgency mode provides the capability for the ADS report to indicate to the ground system(s) that the aircraft is in any one or more of the following:

a) Emergency,
b) No Communications
c) Unlawful Interference
d) Minimum Fuel,
e) Medical, and/or
f) Reserved.

Note 1: Other than for Emergency, the above listing does not imply a hierarchical ordering

Note2: No Communications means total loss of communications capability, both voice and CPDLC, if equipped

3.7.3   During the operation of emergency and/or urgency mode, existing or requested contracts will react in the following ways:

a) for a Demand Contract, the report will contain the requested information plus the emergency and/or urgency status.

b) for a Periodic Contract, any periodic contract is suspended during operation of the emergency and/or urgency mode. The reporting rate on initiation of the emergency and/or urgency mode is the lesser of one minute or half of any periodic contract rate. The position, time and FOM plus the emergency and/or urgency status to be reported are sent with each ADS periodic emergency and/or urgency mode report, and the ground vector is sent with every fifth report.

c) for an Event Contract, any event contract will generate an ADS report with the position, time and FOM plus the emergency and/or urgency status to be reported. Subsequent event reports will contain the requested information plus the emergency and/or urgency status. In addition, any changes to the emergency and/or urgency status will generate an emergency and/or urgency report.

3.8 Modifying an Emergency and/or urgency Mode

a) This capability allows the ground system to send an emergency and/or urgency mode modification message to the avionics. The avionics modifies the reporting rate of the emergency and/or urgency mode, and then sends the emergency and/or urgency reports at the new interval. This only affects the emergency and/or urgency mode reports to the ground system making the request.

b) This capability allows the avionics to modify the emergency and/or urgency mode either on instruction from the pilot or automatically due to a change in the emergency and/or urgency indicators.

3.9 Cancellation of Emergency and/or urgency Mode

a) This function allows the pilot to cancel the emergency and/or urgency mode, or the ground system to cancel the emergency and/or urgency mode indication.

b) When the pilot cancels emergency and/or urgency mode , the avionics sends a cancel emergency and/or urgency mode message to each ground station receiving the emergency and/or urgency mode reports. If there was a periodic contract in place before the emergency and/or urgent situation was declared, it is reinstated.

c) When the ground system cancels the emergency and/or urgency mode indication, the avionics continues to send ADS reports to the ground system as in emergency and/or urgency mode, but the reports are no longer designated as emergency and/or urgency reports by the ground system.

3.10 Summary Table of ADS Functions

1.   Table 3-1 summarizes ADS functionality described above.

MESSAGE	PURPOSE	TRIGGERING CONDITIONS	SOURCE/ DESTINATION
Demand Contract Request	Obtain single ADS report on demand, specifying what data are to be reported	Controller/FDPS request	Ground/Air
Periodic contract request	Request establishment of routine ADS reporting contract; specifying what data are to be reported and at what rate	Airspace proximity, changing airspace conditions	Ground/Air
Event contract request	Request establishment of event ADS contract; specifying certain flight conditions under which relevant data will be reported	Airspace proximity, changing airspace conditions	Ground/Air
Non-compliance notification	Indicates which data cannot be complied with for a given	Contract establishment	Air/Ground

MESSAGE	PURPOSE	TRIGGERING CONDITIONS	SOURCE/ DESTINATION
	contract		
ADS report	Provide ADS data according to contract request	Contract conditions for initiating a report are met	Air/Ground
Cancel contract request	Request cancellation of a specific contract	Air traffic conditions no longer require certain reporting	Ground/Air
Cancel all contracts	Request cancellation of all contracts	Air traffic conditions no longer require any ADS reports from the avionics	Ground/Air
Cancel emergency and/or urgency mode	Indicates cancellation of previously declared emergency and/or urgency state	Pilot canceled emergency and/or urgency mode	Air/Ground
Negative acknowledgment	Indicates that an error has been detected or that the avionics cannot comply with any part of the contract, indicating reason	Contract establishment, cancellation	Air/Ground
Modify Emergency and/or urgency Mode	To change Emergency and/or urgency Mode Reporting Rate To indicate change in emergency and/or urgency indicators	Controller/FDPS request Pilot/avionics	Ground/Air Air/ground
Acknowledgment	Indicates that avionics can comply with contract, however the avionics is unable to send the initial report within 0.5 seconds	Contract establishment, cancellation, Cancel emergency and/or urgency mode indication	Air/Ground

Table 3-1: Summary of ADS Functionality