AERONAUTICAL TELECOMMUNICATIONS NETWORK PANEL

Working Group 3 (Applications and Upper Layers)

Naples (Italy), 18th – 21st May 1999

Proposed New Chapter 8
for ADS SARPs

Presented by: F. Picard

SUMMARY

The subsetting rules specified in Doc. 9705 for the airborne ADS systems mandate data-link aircraft supporting the ADS application to be able to "operate" the four types of ADS contracts, i.e. demand, event, periodic and emergency.

It is likely that, in the "real world", only certain types of ADS contract will be mandated in the aircraft, depending of which ADS-based data link services are set in operation. A typical example is the PETAL-II project in which American Airlines aircraft will operate the ADS demand contract only, the other ADS contracts being not used at all.

WG3/SG2 proposes to add more flexibility in the SARPs by defining operational options for the airborne ADS systems. These systems must be able to process the ground-initiated request for the establishment of any type of ADS contract (i.e. to interpret the request and to respond either positively or negatively) and they have to be able to operate at least on contract type (demand, event or) periodic contract. In addition, the capability of sending emergency reports is now a choice left to the system designers.

WG3 is invited to note the nature of the proposed change and, if necessary, to instruct SG2 to generate a PDR in order to have a new chapter 2.2.8 incorporated in Amendment 1 of Doc 9705.

1.   ADS SUBSETTING RULES IN DOC 9705 Edition 1

Chapter 2.2.1.8 in Document 9705 "SUBSETTING RULES" provides rules for subsetting the ADS SARPs. A SARPs-compliant implementation is authorised to support only a subset of the ADS functions, provided that it conforms to one of the subsets identified in the SARPs.

Doc 9705 Edition 1 identifies 7 configurations for the ground ADS application, depending of the type of ADS contracts allowed to be initiated. The processing of downlinked emergency reports must be supported by the ground system, as long as periodic or event contract can be established.

Ground ADS Configurations

I	Demand contract only
II	Event and Emergency contracts
III	Periodic and Emergency contracts
IV	Demand, Event and Emergency contracts
V	Demand, Periodic and Emergency contracts
VI	Event, Periodic and Emergency contracts
VII	Demand, Event, Periodic and Emergency contracts

The operational requirements in the ADS Manual indicate that "an aircraft should support at least one demand, periodic and event contract with a ground ADS system". It was deduced that there should not be any subsets of the air ADS systems. This was reinforced by the fact that an aircraft does not control at all the type of contract which is requested by the remote ground ADS systems and therefore it must be able to reply to the establishment of any type of contract, i.e. demand, event and periodic. Based on this rationale, Doc 9705 Edition 1 identifies a unique configuration for the air ADS application.

Air ADS Configurations

I	Demand, Event, Periodic and Emergency contracts.

2.   AIRBORNE IMPLEMENTATIONS IN THE "REAL WORD"

The first implementations of the ADS application in the ATC operational environment show that it is unlikely that the aircraft will all be designed to operate all types of ADS contracts. There will be regions where the selection of the operational data-link services will mandate the support by the airborne systems of one, two or three ADS contract types.

For instance, a region where the only ADS-based service operated is FLIPCY (Flight Plan Consistency) may mandate that data-link aircraft support only the demand contract. It would be useless to mandate the operational support of the other services.

However, the aircraft must be able in any case to indicate to the ground that the type of ADS contract requested is not supported by the aircraft. A negative acknowledgement indicating that this ADS service is not available must be sent back to the ground.

 Finally, the Emergency contract is an air-initiated contract which can never be contracted by the ground. The aircraft is therefore free to send or not emergency reports. The decision can be taken for certain types of aircraft that the aircraft will never send emergency reports. The emergency function should therefore be considered as an optional facility onboard, and not intrinsically linked to the periodic or the event contract.

3. PROPOSED NEW ADS SUBSETTING RULES IN DOC 9705

As a consequence of the foregoing, chapter 2.2.8 of Doc 9705 need to be modified to allow subsetting for the air ADS application. The proposed air configurations are identified in the table below.

Air ADS Configurations

I	Demand contract only
II	Event contract only
III	Periodic contract only
IV	Demand and Event contract
V	Demand and Periodic contracts
VI	Event and Periodic contracts
VII	Demand, Event and Periodic contracts
VIII	Event and Emergency contract
IX	Periodic and Emergency contracts
X	Demand, Event and Emergency contracts
XI	Demand, Periodic and Emergency contracts,
XII	Event, Periodic and Emergency contracts
XIII	Demand, Event, Periodic and Emergency contracts

In addition to these changes, it is also propose to remove from chapter 8 all the tables which are now produced in the P/OICS document. The redundancy between SARPs and P/OICS and the induced maintenance problems will thus disappeared.

The same arguments do not apply to the ground. The need for subsets has always been recognised, and they are comprehensively detailed in the current Edition of Doc 9705. No change are proposed to the ground subsets.

Appendix A contains the new chapter 8 proposed to be inserted in Doc 9705.

4. RECOMMANDATION

WG3 is invited to note the nature of the proposed change and, if necessary, to instruct SG2 to generate a PDR in order to have a new chapter 2.2.8 incorporated in Amendment 1 of Doc 9705.

APPENDIX A – ADS SARPs Chapter 2.2.1.8

2.2.1.8 Subsetting Rules

2.2.1.8.1 General

Note. ⎯ 2.2.1.8 specifies conformance requirements which all implementations of the ADS protocol obey.

2.2.1.8.1.1 An implementation of either the ADS ground based service or the ADS air based service claiming conformance to 2.2.1 shall support the ADS protocol features as shown in the tables below.

Note. ⎯ The 'status' column indicates the level of support required for conformance to the ADS-ASE protocol described in 2.2.1. The values are as follows:

    a)   *'M'*   *mandatory support is required;*

    b)   *'O'*   *optional support is permitted for conformance to the ADS protocol;*

    c)   *'N/A'*   *the item is not applicable; and*

    d)   *'C.n'*   *the item is conditional where n is the number which identifies the condition which applicable.*

Table 2.2.1.8-1. ADS Protocol Versions Implemented

	Status	Associated Predicate
Version 1	M	none

Table 2.2.1.8-2. ADS Operational Functional Units

	Status	Associated Predicate
The ADS system acts as an airborne system	C.1	ADS/air
The ADS system acts as a ground system	C.1	ADS/ground
The ADS ground system can establish demand contracts	If (ADS/ground) C.2 else N/A	G-DC-FU
The ADS ground system can establish event contracts and process emergency reports	If (ADS/ground) C.2 else N/A	G-EC-FU
The ADS ground system can establish periodic contracts and process emergency reports	If (ADS/ground) C.2 else N/A	G-PC-FU
The ADS air system can process demand contracts	If (ADS/air) C.3 else N/A	A-DC-FU
The ADS air system can process event contracts	If (ADS/air) C.3 else N/A	A-EC-FU
The ADS air system can process periodic contracts	If (ADS/air) C.3 else N/A	A-PC-FU
The ADS air system can send emergency reports	If (A-EC-FU or A-PC-FU) O else N/A	A-EM-FU

C.1 a conformant implementation shall support one and only one of these options.
C.2 a conformant ground implementation shall support at least one of the three options.
C.3 a conformant air implementation shall support at least one of the three options.

Table 2.2.1.8-3. ADS–ground-ASE Conformant Configurations

	List of Predicates	Functionality Description
I	ADS/ground + G-DC-FU	Demand contract only can be established with the aircraft.
II	ADS/ground + G-EC-FU	Event and Emergency contracts can be established with the aircraft.
III	ADS/ground + G-PC-FU	Periodic and Emergency contracts can be established with the aircraft.
IV	ADS/ground + G-DC-FU + G-EC-FU	Demand, Event and Emergency contracts can be established with the aircraft.
V	ADS/ground + G-DC-FU + G-PC-FU	Demand, Periodic and Emergency contracts can be established with the aircraft.
VI	ADS/ground + G-EC-FU + G-PC-FU	Event, Periodic and Emergency contracts can be established with the aircraft.
VII	ADS/ground + G-DC-FU + G-EC-FU + G-PC-FU	Demand, Event, Periodic and Emergency contracts can be established with the aircraft.

Note. —An ADS ground system may or may not support the modify emergency capability.

Table 2.2.1.8-4. ADS–air-ASE Conformant Configurations

	List of Predicates	Functionality Description
I	ADS/air + A-DC-FU	Demand contract only can be established with the ground system. A Negative Acknowledgement with reason "ADS-service unavailable" is sent when Event or Periodic contracts are requested.
II	ADS/air + A-EC-FU	Event contract only can be established with the ground system. A Negative Acknowledgement with reason "ADS-service unavailable" is sent when Demand or Periodic contracts are requested.
III	ADS/air + A-PC-FU	Periodic contract only can be established with the ground system. A Negative Acknowledgement with reason "ADS-service unavailable" is sent when Demand or Event contracts are requested.
IV	ADS/air + A-DC-FU + A-EC-FU	Demand and Event contracts can be established with the ground system. A Negative Acknowledgement with reason "ADS-service unavailable" is sent when Periodic contracts are requested.
V	ADS/air + A-DC-FU + A-PC-FU	Demand and Periodic contracts can be established with the ground system. A Negative Acknowledgement with reason "ADS-service unavailable" is sent when Event contracts are requested.
VI	ADS/air + A-EC-FU + A-PC-FU	Event and Periodic contracts can be established with the ground system. A Negative Acknowledgement with reason "ADS-service unavailable" is sent when Demand contracts are requested.
VII	ADS/air + A-DC-FU + A-EC-FU + A-PC-FU	Demand, Event and Periodic contracts can be established with the ground system.

VIII	ADS/air + A-EC-FU + A-EM-FU	Event and Emergency contracts can be established with the ground system. A Negative Acknowledgement with reason "ADS-service unavailable" is sent when Demand and Periodic contracts are requested.
IX	ADS/air + A-PC-FU + A-EM-FU	Periodic and Emergency contracts can be established with the ground system. A Negative Acknowledgement with reason "ADS-service unavailable" is sent when Demand and Event contracts are requested.
X	ADS/air + A-DC-FU + A-EC-FU + A-EM-FU	Demand, Event and Emergency contracts can be established with the ground system. A Negative Acknowledgement with reason "ADS-service unavailable" is sent when Periodic contracts are requested.
XI	ADS/air + A-DC-FU + A-PC-FU + A-EM-FU	Demand, Periodic and Emergency contracts can be established with the ground system. A Negative Acknowledgement with reason "ADS-service unavailable" is sent when Event contracts are requested.
XII	ADS/air + A-EC-FU + A-PC-FU + A-EM-FU	Event, Periodic and Emergency contracts can be established with the ground system. A Negative Acknowledgement with reason "ADS-service unavailable" is sent when Demand contracts are requested.
XIII	ADS/air + A-DC-FU + A-EC-FU + A-PC-FU + A-EM-FU	Demand, Event, Periodic and Emergency contracts can be established with the ground system.