

**Ninth Informal Meeting for the Improvement of Air Traffic Services
Over the South Atlantic (SAT/9 Meeting)**

(Lima, Peru 6 to 10 November 2000)

- Agenda Item 5: Communications**
- a) AFTN
 - b) ATS/DS, etc.
 - c) CAFSAT Network and other related COM developments

CAFSAT IN ADS ENVIRONMENT

(Presented by Spain)

Summary

This Working Paper presents several aspects and estimated figures related to the use of CAFSAT as a communication support to expand ADS services all along the EURSAM corridor

1. Introduction

With the incorporation of two new nodes to the Network, Lisbon and Santa Maria, a new configuration for several channels was proposed (by Portugal) in order to make use of the already existing space segment. The reason for this study was to adhere the two new nodes to the CAFSAT network without incrementing recurrent costs to the adjacent FIRs (ANNEX I).

This configuration, to take one, will be followed as the point of departure for our explanation so we can demonstrate that, in a first step, no further expansions of space segment will be needed to implement an expanded ADS service (based on Canary Islands ADS System) on the corridor via Cafsat

Band Width Occupancy for Hemispheric/Global Segment in Cafsat Network*

	<i>Total Global</i>	<i>Used Global</i>	<i>Total Hemi</i>	<i>Used Hemi</i>
Casablanca			128	123.2
Dakar	64	23.2	64	56
Sal				53.6
Recife	64	30.4		
Lisboa			128	118.4
Canarias	64	15.2	128	120.8
StaMaria			128	76.8

* extracted from Annex I table

Taking as reference the ADS System in Canary Islands , we will focus both on a minimum and a intermediate configuration in order to calculate the band width needed in both cases to support the ADS information traffic through the corridor

2. Basic Configuration

On a “Basic Configuration” a node with full ADS capabilities would retransmit (broadcast) ADS information to other CAFSAT nodes to permit them display the ADS traffic along the corridor. There are four main issues to attend:

- 1) Choose a free Data Port in each reception node .
- 2) Reconfigure Modems and Frame Relay switch in order to receive the ADS service
- 3) No space segment augment is needed for receptionist nodes
- 4) For transmission node (node with ADS capabilities) let’s take notice of the following simulations:

Simulation 1 : Simple ADS contract

This contract includes :

- * *predicted root (estimation to next heavy point)*
- * *earth reference (includes position and speed)*

Notification Time	Bytes/message*
12:02:6.62480	122
12:03:13.03380	122
12:04:19.30227	122
12:05:25.58125	122
12:06:31.80975	122
12:07:38.30869	122
12:08:44.46733	122
12:09:50.49618	122

**Information extracted from Canary Islands ADS System*

Will consider **192 bytes to include control data information*

*If in at same instant t, n aircrafts send a notification, a contract solicitude or any other kind of ADS message... the band width occupied would be n*192 bytes. Just with 2.400 bps space segment disposal : 2.400/192 -> 12 notifications could be simultaneously sent.*

“On a simple channel of 2400 bps in the transmission CAFSAT node, up to 720 ADS display messages per minute may be broadcast to all nodes (on a Simple ADS contract configuration)”.

Simulation 2 : Full ADS contract

This contract includes :

- *Flight id
- *Predicted root
- *Earth reference
- *Meteo
- *Airframe identification
- *Air reference
- *Aircraft intent

Notification Time	Bytes/message*
12:02:6.62480	217
12:03:13.03380	217
12:04:19.30227	217
12:05:25.58125	217
12:06:31.80975	217
12:07:38.30869	217
12:08:44.46733	217
12:09:50.49618	217

*Information extracted from Canary Islands ADS System

*Will consider **264 bytes** to include control data information

If in at same instant t , n aircrafts send a notification/contract solicitude/message... the band width occupied would be $n*264$ bytes. Just with 2.400 bps space segment disposal, $2.400/264 \rightarrow 9$ notifications could be simultaneously sent.

“On a simple channel of 2400 bps in the transmission CAFSAT node, up to 540 ADS display messages per minute may be broadcast to all nodes (on a Full ADS contract configuration)”.

So :

Band Width	ADS Message Length	Broadcast display messages per minute
2400	192	720
4800	192	1500
2400	264	540

4800	264	1080
7068	192	2160
7068	264	1560

3. Intermediate Solution

This solution would implement some functionality in the non-ADS nodes :

- . modification of contract period
- . cancel of emergency ADS mode
- . solicitude for contracts delete.

This configuration implies :

- 1) Choose a free Data Port in each node .
- 2) Reconfigure Modems and Frame Relay switch in order to receive/send ADS messages
- 3) previous simulations are valid for the node with full ADS capabilities
- 4) As far as the non ADS nodes are going to transmit , a new channel should be performed in the Cafsat. The message maximum length is **125 bytes** (Canary Island ADS System).

“On a simple channel of 2400 bps in a CAFSAT node, up to 960 ADS messages per minute may be sent from ADS terminal nodes to the ADS full capabilities node”.

<i>Band Width</i>	<i>Message Length</i>	<i>messages per minute</i>
2400	125	1140
4800	125	2280
7068	125	3360