



**INTERNATIONAL CIVIL AVIATION ORGANIZATION**

**FOURTEENTH MEETING ON THE IMPROVEMENT OF AIR TRAFFIC SERVICES OVER  
THE SOUTH ATLANTIC**

Montevideo, Uruguay, 7 to 9 May 2008

- Agenda Item 2: Communications, navigation, surveillance (CNS)**  
**2.3. Interoperability between aeronautical VSAT networks and  
potential use of digital VSAT networks to support ATM  
applications**

**ATS-N5 Voice protocol for EUR-SAM  
Spain-Cape Verde Experience**

(Presented by Spain)

**SUMMARY**

This paper comments the benefits of a Voice Switching Network ATS-N5 and presents the work done between Cape Verde (Sal) and Spain (Canaries ACC) starting up a full operative link based on ATS Ground-Ground voice protocol on a CAFSAT support.

**1. INTRODUCTION**

1.1 The main advantages derived from the use of an ATS Ground Voice Switching Network are summarized below:

1. Reduction of the number of circuits (Ground-Ground links are shared by a number of users);
2. More than one link to access to a user;
3. Direct route and alternate routes are configured among VCSs for call routing;
4. Normal and Priority calls;
5. Automatic line checking;

**2. DISCUSSION**

Call Signalling System in the EUR-SAM corridor

2.1 There must be adopted a common call signalling protocol in an ATS Ground Voice Switching Network. The ATS-R2 or ATS-No.5 signalling systems are recommended for use within the analogue European ATS Ground Voice Network. These should be compliant with the Eurocontrol "ATS-R2 and ATS-No.5 protocol specification (Edition 2.0 07/06/05)".

2.2 In both signalling systems:

- Line signalling is used in order to seize a line, Clear, Block a line and answer a call either calling or called user side. Line signals use one or two tones. VCS's are able to distinguish between different line signals by keeping track of the call state during the call setup or clearing procedure. Line signals can be sent from either side of an inter-VCS link
- Register signalling is used in order to transfer the calling/called user addresses and the call priority level information over the inter-VCS link. Register signalling is also used to transfer status signal information back from a terminating/transit VCS to the originating VCS. Register signalling employs different tone pairs to represent individual digits and status signals. Register signalling can be sent from either side of an inter-VCS link.
- Line signals are compelled implying that each "signal" sent in one direction has a corresponding acknowledgement "signal" in the opposite direction.

2.3 ATS-R2 register signals are compelled implying that each signal sent in one direction must be acknowledged in the opposite direction.

2.4 ATS-N5 register signalling is non-compelled implying that each signal sent in one direction is not acknowledged in the opposite direction.

2.5 The "compelled" characteristic of the ATS-R2 register signals makes ATS-R2 unfeasible for those cases where the signal propagation delay is greater than 35ms; whereas the "non-compelled" characteristic of the ATS-No.5 register signals makes ATS-No.5 less sensitive to signal propagation delay.

2.6 Therefore, **ATS-No.5 is specially useful in those ground lines where the propagation delay is high, or where satellite links are to be used.**

## **CAPE VERDE – CANARIES EXPERIENCE**

2.7 Following the spirit of *SAT13/18b Conclusion ("CAPE VERDE, SPAIN, PORTUGAL and ASECNA implement trials in order to establish the prerequisites related to the implementation of the ATS N°5 protocol in the SAT area, in accordance with ICAO guidance material contained in ANNEX 10 and Doc 9804")*, Spain (Canary Islands) and Cape Verde faced the first step to extend the European standard AGVN (ATS Ground Voice Network) to AFI Region

2.8 The main steps for this program where :

### 1) Cape Verde & Canary Islands VCSS Configuration

Both VCS should be compatible with it or, at least, permit the required upgrades to support this voice network protocol . Anyway is important to notice that ATS-N5 may be implemented on a "bilateral basis" between ACCs, as it is able to coexist with the actual configuration for voice communications for other collaterals.

Up to day both Canary Islands and Sal VCCs are totally compatible with ATS-N5

## 2 ) Local Numbering Plan

A “two- collateral” numbering plan was designed so ATS-N5 could be configured to be used. At this point is important to comment that “Area benefits” only can be met if a Numbering plan is established so conclusion SAT13/7 should be recalled

*“SAT States , Organizations concerned and ICAO Regional Offices take the necessary steps to include in GREPPECAS and APIRG work programs studies on the implementation of ATS Voice Numbering Plan for AFI and SAM Regions , as defined by the recommendation contained within ICAO Manual on ATS Ground-Ground Voice Switching and Signalling (Doc 9804,Chapter 2 Section 2.3).*

## 3 ) CAFSAT channels

2.9 As limited bandwidth was available , deep studies where performed on signalling compression , always taking care of quality and security margins .Although the initial bandwidth required for an voice channel ATS-N5 is 32 Kbps, it was appointed the possibility of a higher compression to reduce this requirement to 16 Kbps depending of the equipment. Also optimal bandwidth resources criteria were introduced (AFTN channels to 2400 bps, “on demand” option with 0 occupancy,...)

2.10 The reservation of Satellite bandwidth incorporating ATS-N5 foreseen was appointed , so as the configuration of the services for a future implementation.

2.11 As result , two trials were successfully followed :

- Voice Communication ATS-N5 (on CAFSAT VSAT) between Canaries and Sal ACCs
- Voice Communication Lisbon ACC-Sal ACC through Canaries ACC (routing ATS-R2 \* ATS-N5)

**Once trials has finalised Ground Voice Communications between Canaries ACC y Sal ACC are ATS-N5 in final implementation phase on CAFSAT link**

## **3. ACTION BY THE MEETING**

3.1 The SAT/14 Meeting is invited to:

- a) Take note of the information provided in this WP
- b) AFI Numbering Plan
- c) propose the ATS-N5 signalling system for ATS Ground-Ground voice calls in the EUR/SAM corridor.

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