ATTACHMENT TO APPENDIX A

TECHNICAL ANNEX

1. GENERALITIES

This Technical Annex, which corresponds to the Technical Bilateral Cooperation Agreement entered into between Colombia and State / Organization, specifies the technical and operational conditions that shall govern the installation, start- up and operation of aeronautical services, established in the FASID Document, Tables CNS 1A y C, using the remote stations of the Colombian VSAT network.

2. SYSTEM EQUIPMENT

The Colombian State shall provide communications services between the corresponding ACCs in the agreement, with the following specifications:

2.1 SPACE SEGMENT.

INTELSAT IS-805
Geostationary Satellite located at 304,5 E.
The Satellite footprint is hemispheric.
Extended C Band.
In the 10 / 10 Transponder with linear polarization.
BER 1E (-7).
Blockage Probability: 0.003
Availability: 99.96 %.

2.2 SATELLITE HUB.

Located at the ELDORADO Airport in the city of Bogotá, D. C. – COLOMBIA.
7.2 meter Antenna.
Management Center (Teleport).
Provider: **HUGHES NETWORK SYSTEMS** with **TES** (Telephone Earth Station) technology.
Satellite access system: **SCPC** (Single Carrier Per Channel).
Voice channel management capability: **4W E&M PAMA** with 8 Kbps. compression, as well as **DAMA telephone voice** both for ATS services and for telephone extensions in the administrative area.

Management, supervision and control for the Multiplexor System in the PCs installed in Bogotá.

Geographic redundancy for the HUB in the city of Barranquilla, with the same features, which at any time can fail over and assume Network Management and Control.

2.3 2.4 meter GROUND STATION.

EQUIPMENT TABLE FOR THE TYPE 3 VSAT STATION

SATELLITE EQUIPMENT	QTY.
RF AND ANTENNA	
2.4 Mts CB, 2pc, Linear polarization	1
Penetrating Mount	1
LNA	1
FEED HORN	1
MTI, 10 W, C-Band, 70 Mhz	1
TES EQUIPMENT	
TES 4 Slot Analog Chassis, Universal AC	1
TES 4 Slot Rack Mount Shelf kit	1
TES Quantum CU	3
2 Wire loop US ICM Module /V35	1
2 Wire loop ICM Module	1
IFL conn kit 807/810 PVC 130/plen130	1
IFL PVC Coax type3 1000'/304 Mts	1
IFM	1
MULTIPLEXOR GDC	
OCM-1210/1000 SHELF CCM with Power Supply	1
V35 LIM	1
DVP 2W FXS	1
DDC RS232	1

3. INSTALLATION

Installation works shall be the responsibility of the Colombian State, in accordance with the activities schedule that is proposed in this Annex.

NOTE: The schedule is subject to adjustments during the development of the works.

The State / Organization that receives the VSAT station shall ensure optimum temperature conditions at the site where the equipment is to be installed, including fitting out an air conditioning system. In addition, and as a guide, the following is to be considered:

- Carrying out the required civil works, a 1m x 1m x 1m concrete foundation, which shall be poured and cast at the time that the support canister for the antenna is installed, with the respective PVC ducts for the installation of the antenna cabling and grounding protection.
- Provide the grounding connection points both at the antenna and at the equipment room.
- Provide the necessary connectors to connect the satellite circuits to their applications.
- Provide the services, either with a connector strip or with connectors, inside the equipment room, at the closest location to where our equipment is to be installed.

- Obtain the required permits to bring our testing equipment into your country and return it to Colombia, as well as for our personnel to enter your facilities.
- Supply commercial electricity at 110 VAC, with independent connection and protection.
- The standard 19" cabinet or rack to erect the equipment requires access from the front and the rear. Inside of it, it should be possible to interconnect the services by means of a connector strip or by means of a connector in the case of data. Electrical connection with at least 6 feed sockets at 110 Volts, 60 Hz, with a protection breaker.
- In order to ensure availability of the VSAT station, the equipment rack shall be connected to UPS systems.
- Estimated power consumption of our equipment is 1 KVA, which shall be supplied from an UPS.

4. SITE SURVEY

Aspects to be verified during SITE SURVEY.

- Availability of space and fitting out that is required, for electrical connections, interconnection cables and air- conditioning system, to ensure the proper operation of the circuits to be implemented.
- Availability of the elements and interfaces that may be required by your equipment to interconnect with our network, which possesses standard RS232 interfaces for the data circuits with a DB 25 connector; V.35 interfaces with a DB 25 connector.
- Perform the respective study on interferences, bearing in mind that we work on the Extended C Band, with linear polarization.
- Orientation of the antenna.
  - Latitude/ Longitude/ Azimuth/ Elevation/ Declination for the area.
  - Type of area: Urban, suburbana or rural.
  - Type of roofing, availability of cable- bearing trays.
  - Installation site, considering that we work with the INTELSAT 805 and require a perfect line of vision, without any possible obstruction.
  - Type of available area.
  - Blueprint or sketch of the site, including the possible location for the antenna.
  - Photorgraphs of the site, illustrating the previous item.
  - Recommendations for the installation.

5. SERVICES TO BE PROVIDED

As well as established in the FASID document, Tables CNS 1A and C, with the use of the link provided by Colombian VSAT Network, will be able the following services:

AFTN DATA at 1,200 Kbps with RS232 interface	Units: 1
ATS Pama- type connection at 8 Kbps	Units: 1
Technical coordination channel at 8 Kbps	Units: 1

The interfaces to be used for each service may be agreed to in accordance with each State's requirements.

6. SERVICE FOR FAILURES.

In the event that a failure were to occur at the channel level in the multiplexor, each module has a double channel. Thus, the free channel can be programmed from the TELEPORT, and it would only be necessary, once the failure has been coordinated with Bogotá, to fail over the connection of the service to the reserve channel.

Similarly, the satellite cards (CU: channel unit), could, if required, take over the required programming and function as a data or voice channel.

Once the failures have been verified and established in coordination with your technical personnel, and that particular service reestablished, during the week following the event, the replacement module will be delivered.

7. CONTACTS IN COLOMBIA.

24- hour technical coordination is available from the Teleport in the city of Bogotá.
With ATS at 258 or at 220.
Through telephone extension in the network itself, at: 3102 – 3666 – 2272.
Direct telephone line: 571 4135334 - 571 2663102.
Fax: 571 4138428.
e-mail: danzola@aerocivil.gov.co
cmayorga@aerocivil.goc.co
geguzman@aerocivil.gov.co

OVERALL SCHEDULE OF ACTIVITIES FOR INSTALLATION

Id	Nombre de tarea
1	PROYECTO IMPLEMENTACION ES
2	Protocolización del Convenio
3	Site Survey
4	Configuración de la Estación en Bogc
5	Pruebas en Bogotá
6	Envio equipos al Sitio
7	IMPLEMENTACION DE LA ESTACIC
8	Viaje Bogotá - Estación Remota
9	Instalación y pruebas de la Estación
10	Presentación de la Red
11	Capacitación Mantenimiento Estación
12	Viaje Estación Remota - Bogotá