**AIR TRAFFIC AND NAVIGATION SERVICES CO. LTD**



**REQUEST FOR PROPOSAL: ATNS/EP/RFP054/22.23/CAFSAT VSAT TERMINAL**

**APPOINTMENT OF A SERVICE PROVIDER FOR DESIGN, SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF VSAT TERMINAL AT THE NEW LUANDA AIRPORT.**

**Volume 2**

**TECHNICAL REQUIREMENT SPECIFICATIONS**

**November 2022**

**The information contained within this document is confidential to ATNS in all respects and it is hereby acknowledged that the information as provided shall only be used for the preparation of a response to this document. The information furnished will not be used for any other purpose than stated and that the information will not directly or indirectly, by agent, employee or representative, be disclosed either in whole or in part, to any other third party without the express written consent by the Company or its representative.**

**TABLE OF CONTENTS**

[10. CAFSAT Terminal installation 6](#_Toc114226402)

[10.1 Introduction 6](#_Toc114226403)

[10.2 CAFSAT Terminal Requirements 9](#_Toc114226404)

[10.3 Satellite Transponder Access and Usage 10](#_Toc114226405)

[10.4 CAFSAT VSAT Terminal Configuration 11](#_Toc114226406)

[10.5 CAFSAT VSAT Terminal Redundancy 11](#_Toc114226407)

[10.6 Standard Site Installation 11](#_Toc114226408)

[10.7 CAFSAT VSAT Outdoor Antenna Equipment Installation 16](#_Toc114226409)

[10.8 VSAT Outdoor RF Equipment Installation 16](#_Toc114226410)

[10.9 VSAT Indoor Baseband/IF Equipment Installation 18](#_Toc114226411)

[10.10 VSAT Indoor UPS Installation 19](#_Toc114226412)

[10.11 VSAT Terminal Indoor Equipment Racks Installation 21](#_Toc114226413)

[10.12 Remote Site Installation Procedures 22](#_Toc114226414)

[11. installation requirements 23](#_Toc114226428)

[11.1 General Installation Requirements 23](#_Toc114226429)

[11.2 Individual Site Surveys 23](#_Toc114226430)

[11.3 Equipment Distribution and Clearance 25](#_Toc114226431)

[11.4 Procedures for Transfer of Operations 26](#_Toc114226432)

[12. VSAT terminal maintenance requirements 26](#_Toc114226433)

[12.1 General Maintenance Requirements 26](#_Toc114226434)

[12.2 Terminal Availability 28](#_Toc114226435)

[12.3 On-Site Maintenance Requirement 28](#_Toc114226436)

[12.4 Service Provider Maintenance Support 29](#_Toc114226437)

[13. training requirements 29](#_Toc114226438)

[13.1 Pre-installation Comprehensive Supplier Training 29](#_Toc114226439)

[13.2 On-Site Operation and Maintenance Training 30](#_Toc114226440)

[14. spare parts, tools and test equipment 31](#_Toc114226441)

[14.1 Spare Part Calculation 31](#_Toc114226442)

[14.2 Service Provider Spare Parts and Spares Pool 31](#_Toc114226456)

[15. verification and Qualification REQUIREMENTS 32](#_Toc114226457)

[15.1 General Network Verification and Qualification 32](#_Toc114226458)

[15.2 Responsibility for Network and Site Parameter Configuration 33](#_Toc114226459)

[15.3 Responsibility for INTELSAT Carrier Line-up and Terminal Verification 33](#_Toc114226460)

[15.4 Installation and Site Commissioning Testing 34](#_Toc114226461)

[15.5 Site Acceptance Documentation 34](#_Toc114226464)

[15.6 Responsibility for Individual Station-to-Station Testing 34](#_Toc114226465)

**ABBREVIATIONS**

|  |  |
| --- | --- |
| AC | Alternating Current |
| ACELP | Algebraic Code Excited Linear Prediction |
| ADPCM | Adaptive Differential Pulse Code Modulation |
| AFTN | Aeronautical Fixed Telecommunications Network |
| ATN | Aeronautical Telecommunications Network |
| ATNS | Air Traffic and Navigation Services Company |
| ATS/DS | Air Traffic Services/Direct Speech |
| BITE | Built in Test Equipment |
| bps | Bits per second |
| CAA | Civil Aviation Authority |
| CMIP | Common Management Information Protocol |
| CMP | Configuration Management Plan |
| DCE | Data Communications Equipment |
| DP | Documentation Plan |
| DTE | Data Terminal Equipment |
| DTMF | Dual Tone Multi Frequency |
| E+M | Ear plus Mouth |
| EIRP | Effective Isotropic Radiated Power |
| ET | Engineering Technician |
| FAD | Frame-relay access device |
| FAT | Factory Acceptance Test |
| FEC | Forward Error Correction |
| FM | Frequency Modulation |
| FR | Frame Relay |
| FXO | Foreign Exchange Office |
| FXS | Foreign Exchange Service |
| GHz | Giga Hertz |
| ICAO | International Civil Aviation Organization |
| IEC | International Electro-technical Commission |
| IF  | Intermediate Frequency |
| IS  | INTELSAT Satellite |
| kVA | Kilo-Volt-Ampere |
| LCC | Life Cycle Costing |
| LRU | Line Replacement Unit |
| LSA | Logistic Support Analysis |
| MDF | Multi Distribution Frame |
| MHz | Mega Hertz |
| MOU | Memorandum of Understanding |
| MTBF | Mean Time between Failures |
| NAFISAT | North East AFI VSAT sub-network |
| NMS | Network Management System |
| OEM | Original Equipment Supplier |
| OJT | "On-the-Job Training |
| PBU | Period of Beneficial Use |
| PHS&T | Packaging, Handling, Storage and Transportation |
| PTT | Press-to-Talk |
| RCMS | Remote Control and Monitoring System |
| RF | Radio Frequency |
| RFT | Request for Tender |
| SADC | Southern African Development Community |
| SADC2 | SADC VSAT II Sub-network |
| SAT | Site Acceptance Test |
| SCPC | Single Channel per Carrier |
| MCPC | Multiple Channel per Carrier |
| SNMP | Simple Network Management Protocol |
| SSI | Station Standing Instructions |
| TEP | Test Equipment Plan |
| TP | Training Plan |
| U | One Equipment Rack Height |
| UPS | Uninterruptible Power Supply |
| VHF | Very High Frequency |
| VSAT | Very Small Aperture Terminal |
|  |  |

# CAFSAT Terminal installation

## Introduction

1. Luanda Central Atlantic FIR Satellite (CAFSAT) terminal, which is part of CAFSAT network, is utilised for ATS/DS and AFTN/AHMS. (I).

The Luanda terminal is a C-band VSAT station.

The interconnectivity of Aeronautical Fixed Services are based on the ICAO AFI Plan and provides communication between the Area Control Centres. The CAFSAT network utilize INTELSAT 901, transponder 36 for the space segment. Diagram 10.6 shows a Luanda CAFSAT terminal (I).

1. This document describes the technical requirements for the installation of the Luanda CAFSAT network terminal. (I):

**10.1.3 Tender Response**

10.1.3.1 Bidders shall provide a written response to each paragraph in this Volume 2: Technical Requirement Specifications. Bidders are required to state compliance (C) in this regard (M).

10.1.3.2 Requirements marked (I) are for information purposes and the bidders are required (M).

10.1.3.3 Failure to respond as instructed in 3.1 and 3.2 will result in the bid being regarded as non-responsive and subsequently disqualified.

10.1.3.4 Bidders are referred to the relevant paragraphs in Volume 1, stipulating the structure of the response to this tender and are advised to strictly follow these stipulations (M).

10.1.3.5 Any additional or supportive information that the Bidder feels is necessary for clarification shall be included and referred to in the response. (M)

**10.1.4 Scope**

10.1.4.1 Design, supply, installation, testing and commissioning of VSAT terminal at the new Luanda airport. The terminal will form part of the CAFSAT network. The design shall be based on the current existing equipment (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

**10.1.5. CAFSAT Terminal Equipment List**

10.1.5.1 **Table 1** below identifies a list of existing equipment for the current terminal (M).

**Table 1: CAFSAT Equipment List**

|  |
| --- |
| **Antenna (Prodelin 3.8 metre)** |
| 1.1 | C-BAND FEED |   |   |
| 1.2 | REFLECTOR |   |   |
| Radio Frequency |
| 2.1 | TX C BAND 1:1 |   |   |
| 2.2 | C BAND TX 1 | ANACOM | 10EC-EL 32025 |
| 2.3 | C BAND TX 2 | ANACOM | 10EC-EL 32025 |
| 2.4 | C BAND TX SPARE | ANACOM | 10EC-EL 32025 |
| 2.5 | PS | ANACOM | PS 32314 |
| 2.6 | SWITCH DUAL | ADVANTECH SWITCH TECHNOLOGY |   |
| 2.7 | 1:1 LNB CONTROLLER |   | AST137W/-12 |
| 2.8 | LNB 1 | NORSAT | 1211-001916 |
| 2.9 | LNB 2 | NORSAT | 1211-001916 |
| 2.10 | LNB SPARE | NORSAT | 1110-001116 |
| 2.11 | RX SWITCH 1:1 CONTROLER | C&M SYSTEMS | DNL-4 |
| 2.12 | SWITCH | SECTOR MICROWAVEIND., INC. | 2AGSM |
| **Intermediary Frequency** |
| 3.1 | MODEM1 | COMTECH | DMD20LBST0-146 |
| 3.2 | MODEM2 | COMTECH | DMD20LBST0-146 |
| 3.3 | MODEM3 | COMTECH | DMD20LBST0-146 |
| 3.4 | MODEM SPARE | COMTECH | DMD20LBST0-146 |
| 3.5 | SPLITTER | GLOBAL PROFESSIONAL | SPLIT 4AN-PRO |
| 3.6 | COMB | GLOBAL PROFESSIONAL | COMB 4PN-PRO |
| **Baseband** |
| 4.1 | FRAME RELAY SWITCH | MEMOTEC | 150-0031-000 |
| 4.2 | FRAD 1 | MEMOTEC | 150-0031-000 |
| 4.3 | FRAD 2 | MEMOTEC | 150-0022-030 |
| 4.4 | DUAL VOICE FXS CARD | MEMOTEC | 161-1030-000 |
| 4.5 | DUAL VOICE FXS CARD | MEMOTEC | 161-1050-000 |
| 4.6 | BRI CARD | MEMOTEC | 161-1033-000 |
| 4.7 | DSP 15 CHANNELS | MEMOTEC | 160-1038-200 |
| 4.8 | FRAD SPARE 1 | MEMOTEC | 150-0031-000 |
| 4.9 | FRAD SPARE 2 | MEMOTEC | 150-0022-030 |
| 4.10 | DUAL VOICE FXS CARD | MEMOTEC | 161-1030-000 |
| 4.11 | DUAL VOICE FXS CARD | MEMOTEC | 161-1050-000 |
| 4.12 | BRI CARD | MEMOTEC | 161-1033-000 |
| 4.13 | DSP 15 CHANNELS | MEMOTEC | 160-1038-200 |
| 4.14 | ETHERNET SWITCH | CISCO | SG100-16 V2 |
| **Monitoring and Control** |
| 5.1 | SERVER | HP | 470065-491 HP |
| 5.2 | HARD DRIVE |   |   |
| 5.3 | DVD |   |   |
| 5.4 | NETWORK CARD |   |   |
| 5.5 | OPERATIVE SYSTEM |   |   |
| 5.6 | SIGER SERVER |   |   |
| 5.7 | PC CLIENT | HP | LX816EA#ABE |
|  |
| 5.8 | HARD DRIVE |   |   |  |
| 5.9 | DVD |   |   |  |
| 5.10 | NETWORK CARD |   |   |  |
| 5.11 | OPERATING SYSTEM | MICROSOFT | WINDOWS7 PRO OA SP1 |  |
| 5.12 | SIGER CLIENT |   |   |  |
| 5.13 | SERIAL/ETHERNET CONVERTER | MOXA | NPORT 5450 |  |
| **Equipment Cabinets** |  |
| 6.1 | RACK |   |   |  |
| 6.2 | INTERFACE PANEL 1 |   |   |  |
| 6.3 | INTERFACE PANEL 2 |   |   |  |
| 6.4 | REPARTIDOR 1 |   |   |  |
| **Power** |  |
| 7.1 | RACK |   |   |  |
| 7.2 | RACK EQUIPMENT OUTLET 1 |   |   |  |
| 7.3 | RACK EQUIPMENT OUTLET 2 |   |   |  |
| 7.4 | POWER DISTRIBUTION PANEL |   |   |  |
| 7.5 | FAN |   |   |  |
| 7.6 | LIGHT |   |   |  |

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

10.1.5.1.1 An obsolescence study shall be conducted on the list of equipment and software listed under **Table 1** above. An obsolescence tracking sheet shall be completed and submitted with this RFT. An alternative proposed equipment and software shall be accompanied by an equipment and software datasheet to ascertain compliance (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

**10.1.5.2 Requirements for ATS/DS circuit connectivity**

**10.1.5.2.1 Table 2** below identifies the different ATS/DS voice circuits required from and between the Luanda Air Traffic Control Centre, Lisbon and Recife (M).

| **ATS Circuits for Voice Communications** | **Status** | **VSAT****Network** |
| --- | --- | --- |
| **Terminal A** | **Terminal B** |
| **Angola** |
| Luanda | Lisbon | I | CAFSAT |
| Recife | I | CAFSAT |

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

**10.1.5.3 Requirement for AFTN connectivity**

**10.1.5.3.1 Table 3** below identifies the different AFTN data circuits required from and between Luanda Air Traffic Control Centre, Lisbon and Recife (M).

| **Data Circuits for AFTN Communications** | **Status** | **VSAT****Network** |
| --- | --- | --- |
| **Terminal A** | **Terminal B** |
| **Angola** |
| Luanda | Lisbon | I | CAFSAT |
| Recife | I | CAFSAT |

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## CAFSAT Terminal Requirements

ENANA requires to install a VSAT for the CAFSAT network for coordinating their fixed aeronautical ATS/DS, AFTN and ATN communications between main Air Traffic Control Centres. The VSAT terminal shall be designed, supplied, installed, tested, commissioned, and set to work (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **No Single Point of Failure.** Hubless network operation with no potential single point of network failure (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Single Satellite Hop Communications.** Meshed voice and data communications paths over a single satellite hop (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **High Speed Carrier Transmission.** Single high speed carrier transmission from any network terminal at any time (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **High Speed Carrier Reception.** Simultaneous reception of at least two (2) high speed carriers by any network terminal at any time (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Modem Symbol rate.** 200 KBaud or higher, variable in 1 KBaud increments (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Satellite Transponder Access and Usage

The VSAT terminal shall access the available satellite transponder capacity based on:

1. **Multiplexing of Carriers.** Time and/or frequency multiplexing of the transmission carriers (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Main Network Synchronisation.** Main network synchronisation from any one or more allocated standard network terminal for time multiplexing of transmission carriers (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Standby Network Synchronisation.** Standby network synchronisation from any one or more allocated standard network terminal for time multiplexing of transmission carriers (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Main/Standby Switch-over.** Switch over to the standby network synchronisation after failure of the main network synchronisation shall be accomplished in less than 5 seconds (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Bandwidth-on-Demand Capacity.** Dynamic assignment of the available transmission capacity per network terminal (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Bandwidth-on-Demand Calculation.** A transmission capacity calculation algorithm in relation to the actual user traffic demand of network terminals at any point in time (M)

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## CAFSAT VSAT Terminal Configuration

The installation shall be based on the existing outdoor/indoor equipment configuration (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## CAFSAT VSAT Terminal Redundancy

The terminal shall be installed based on the following equipment redundancy (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Outdoor Redundancy Configuration.** Outdoor equipment is provided in a full 1+1 redundancy configuration with protection switching as shown in the diagram 10.6 below (I).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Protection Switching.** The RF protection and switching equipment consist of a monitoring and redundancy control unit, a waveguide/co-axial cable protection switching unit and waveguide/co-axial direction switches (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Monitoring and Redundancy Control.** The monitoring and redundancy control unit monitor alarms and status information of the RF up/down-converter and solid state power/low noise amplifier equipment and initiate switching commands to the waveguide/co-axial cable protection switching unit (I).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Indoor Redundancy Configuration.** Indoor equipment will be supplied and installed in the non-redundant configuration. Where redundancy in indoor equipment is required, such redundancy will be negotiated with the successful Contractor after contract award (M)

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Standard Site Installation

CAFSAT VSAT site shall be installed to ensure continued operation for at least 10 years from the date of commissioning of the terminal. For tender purposes the quotation for the site works will be based on a Standard Site Installation, and will consist of the work as described below (Refer to Diagram 10.6 below for a graphical presentation of the hardware installation requirements). The tenderer must also quote for a site survey for to finalise the installation specifications (refer to paragraph 12.2 in this document). The required Standard Site Installation is described in the following paragraphs (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

### Outdoor Equipment Installation

1. Supply, installation, testing and commission if antenna systems. (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Supply, installation, testing and commissioning of radio frequency equipment (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Sealing of cable all connectors (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Installation and testing of the antenna earth system to OEM’s specification, where required. The testing will involve the measurement of the earth resistance to ensure that it complies with the manufacturer’s requirements. The measured earth resistance should be typically 5 Ohms or less (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Installation of antenna shall include the following (M):
	1. Civil works. Antenna concrete platform according to manufacturer's recommendations. Earthing system as per manufacturer’s specification.
	2. Antenna mechanical assembly.
	3. Antenna assembly.
	4. Antenna satellite alignment.
	5. installation of feed horn cover
	6. Mechanical supports and tightening where required.
	7. Cable connection and labelling.
	8. Replace bird spikes
	9. sealing of all cable conduits

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

### Indoor Equipment Installation

1. Supply, installation, testing and commissioning of intermediary frequency (IF) (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Supply, installation, testing and commission of Baseband equipment (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Supply, installation, testing and commissioning of monitoring and control equipment and software. This shall also include the integration on the to the terminal (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

### UPS Installation

10.6.3.1A UPS must be provisioned for and a quotation provided. Should it be established during the site surveys that a suitable local Uninterrupted Power Supply is available, it is proposed that the new VSAT indoor cabinet be connected to that supply, in which case it will not be required to provide new UPS equipment (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

10.6.3.2 The requirements for the UPS installation are described in paragraph 10.11 below (I).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

### On-Site Training

On-site training will be provided at the time of the installation of the terminal. The training conducted will include for both theoretical and practical training in order to provide technical personnel to operate and maintain the terminal to the required CAFSAT network availability specifications. The site-training program will include but not be limited to (M):

1. Basic overview and operation.
2. Handbooks handling and use.
3. Basic installation and configuration.
4. VSAT terminal operation.
5. Failure identification and localisation.
6. Maintenance procedures and actions.
7. Preventative maintenance procedures.
8. Actions and procedures during transfer of operation to the new indoor equipment.

Please also refer to paragraph 12.4 below for more information.

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

### Testing

The site will be individually tested and commissioned to show conformance to the CAFSAT network and VSAT technology as offered. Commissioning test will include but not be limited to :

1. Coordination with INTELSAT regarding activities related to bringing up a service, registration, configurations, commissioning and verification of the operational status in accordance with paragraph 17.3 in this document (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Physical inspection of the indoor and outdoor installation work (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Station verification testing and registration as required by the satellite operator (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Technical and operational network performance testing (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. AFTN/AHMS, ATS/DS and ATN interconnectivity testing from and between a particular site and the adjacent sites.

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Incoming AC Mains verification and VSAT terminal UPS and Power Supply testing, where supplied.

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |



**Figure 10.6: Typical CATSAT Terminal Layout**

## CAFSAT VSAT Outdoor Antenna Equipment Installation

The terminal on the shall be installed as indicated in paragraph 10.6.1 and based on the following requirements:

10.7.1 **Antenna Equipment Mounting Frame and Supports**. All mountings and structural supports shall be supplied, installed, tested, and commissioned (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

10.7.2 **Lightning and Earthing Protection.** Lightning and grounding/earthing protection shall be supplied, installed, tested, and commissioned. Protection shall include but not be limited to, antenna lightning spike, lightning spike down conductor, antenna earth straps and earth rods (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

10.7.3 **Antenna Size.** The antenna size will be used in the EIRP calculation in relation to the voice and data traffic generated. (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## VSAT Outdoor RF Equipment Installation

CAFSAT VSAT terminal shall be installed with new RF transmit and receive equipment compliant to and based on:

1. **Transmit and Receive Redundancy.** RF transmit and receive outdoor equipment shall be provided in the redundancy configuration as given in paragraph 10.5 above (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Transmitter Input Frequency.** The input to the RF up-converter and solid state power amplifier shall be compatible with the existing L-band or new combiner equipment and output of the indoor modulator offered (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Transmitter Output Frequency.** The output of the solid state power amplifier shall cover the frequency range 5.85 - 6.425 GHz (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Receiver Output Frequency.** The output of the RF down-converter and low noise amplifier shall be compatible with the existing L-band or new splitter and input of the indoor demodulator offered (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **RF Equipment Power Supply.** The RF up/down-converter and solid state/low noise power amplifier DC power supply unit shall be installed (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **RF Equipment Redundancy Control and Monitoring.** The RF up/down-converter and solid state power/low noise amplifier shall be provided with remote control and monitoring functionality for interconnecting to the RF protection assembly as described in paragraph 10.5 above (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **RF Equipment Operating Temperature.** The RF up/down-converter and solid state power/low noise amplifier shall be capable of operating between -40°C to + 55°C (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **RF Transmitter Size.** The size of RF up-converter and solid state power amplifier shall be sized accordingly. This and the antenna sizes shall be taken into account when calculating the EIRP in relation to the voice and data traffic (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Transmitter Input Back-off.** Provision shall be made in the calculations for at least a 1 dB input back-off for each individual RF carrier transmitted through the RF up-converter and solid state power amplifier (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Antenna Foundation.**  New antenna foundation shall be constructed according to OEM specification (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Underground Cable Ducting.** Underground ducting for running RF interfacility coaxial, mains and signal control cables shall be constructed (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Equipment Building Cable Entrance.** New cable entrance shall be established (M)

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Cable Duct Entrance/Exit**. The underground cable duct and cable terminating at the antenna base/pedestal and equipment building cable entrance shall be sealed for possible water ingress into the cable duct or cable sleeve. Cable sleeve entrances shall be sealed to prevent access for rodents, insects and dust (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Cable Lightning Protection and Earthing.** RF inter-facility and signal outdoor cabling lightning protection and cable earthing assemblies shall be supplied, installed and tested for proper electrical connectivity (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Cable Termination Point Waterproofing.** Where cable are terminated with a specific connector onto a termination point or position on outdoor equipment, such cable connection shall be waterproofed with self-adhesive black weather resistant tape (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Cable Marking and Labelling.** Cables shall be marked and labelled in accordance with an agreed upon cabling marking and labelling system and the approved installation cabling diagram (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Antenna RF Radiation Marking.** Antenna and RF outdoor equipment shall be provided with radiation warning markings in accordance with the manufacturer's specifications (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## VSAT Indoor Baseband/IF Equipment Installation

The terminal installation shall be provided with baseband/IF transmit and receive equipment compliant to and based on:

1. **Integrated Indoor Unit.** The CAFSAT indoor modulator, demodulator, control unit and processor shall be housed in a integrated, equipment 19” rack mountable, unit (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **User Interface Ports.** The integrated indoor unit, individual modulator and individual demodulator shall have at least the following user ports:

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

* 1. IEEE 802.3, 10/100/1000 BaseT, RJ-45 port for interconnecting to individual user LAN type networks and multiplexer/router/switch equipment (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

* 1. USB – A 2.0 port for image updates and configuration loading (M)

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

10.9.3 **User Access Interfaces.** The baseband access device/router shall provide all physical access interfaces to user type equipment and shall provide for but not be limited to:

* 1. 2-Wire FXS (or FXO where required), loop start and/or ground start telephony interfaces with DTMF signalling. 2-Wire interfaces shall either be user selectable via software control or be an individual swappable interface (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

* 1. 4-Wire E+M Type I, II or V telephony interfaces with DTFM signalling (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

* 1. EIA RS-232, V.10/V.11, V.24/V28, asynchronous data interfaces (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

* 1. X.21/V.11, V35, RS-232/V.11, synchronous data interfaces, DCE/DTE user selectable (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

* 1. IEEE 802.3, 10/100 BaseT Ethernet interfaces (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Multiple Access Interfaces.** The baseband access device/router shall have multiple access interfaces per physical chassis unit (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Expandability.** The baseband access device/router shall be stackable or daisy-chainable to provide for the correct number of voice and data ports (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Cable trunking.** Where required for installation purposes standard white high impact resistant PVC miniature indoor trunking shall be installed and used to distribute access and mains supply cables between the indoor equipment racks and the End-User equipment and mains distribution boxes (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Cable Lightning Protection and Earthing.** All voice and data cables shall be provided with lightning, earthing and surge protection (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Cable Marking and Labelling**. All cables installed as part of the installation shall be marked and labelled in accordance with an agreed upon cabling marking and labelling system and the approved installation cabling diagram (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## VSAT Indoor UPS Installation

The terminal shall be provided with an uninterruptible standby power supply unit (UPS) subject to and based on the following requirements:

1. **UPS Units.** The UPS Unit that need to be installed shall be confirmed during the physical site surveys. For the purposes of the tender response, the tenderers shall include for the supply of UPS unit. (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Local Uninterrupted Power**. Should it be established during the site surveys that a suitable local Uninterrupted Power is available at a particular site, it is proposed that the new VSAT indoor cabinet be connected to that supply (I).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Configuration.** True "on-line" double isolation/conversion technology consisting of rectifier/charger sub-system, battery sub-system, conversion sub-system (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Input Feed.** The UPS shall be capable of accepting a single phase input mains power feed of 220/240 ± 15% Volt AC and input frequency of 45 to 60 Hz (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Output Feed.** The constant delivered output mains feed shall be user selectable at 220 V AC, 230 V AC and 240 V AC (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Efficiency.** The conversion efficiency shall be in excess of 90 % (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Frequency Tolerance.** Output Free running Frequency shall be ± 0.1 % or less (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Size per Site.** Each UPS shall be sized according to the site's power consumption at maximum load and shall be either 6 kVA or 10 kVA in accordance with the power supply and consumption sizing. Larger UPS's shall be supplied and installed only at those sites the power consumption is in excess of 10 kVA (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Status and Alarm Indications.** The UPS shall have front panel display of status and alarm indications (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Remote Access Interface.** The UPS shall have a standard RS-232/V.10 V.24/V.28 asynchronous data interface for connection to the Network Management System or other computer system for remote management functionality (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Software Configurable.** The UPS shall be fully software controllable, configurable and manageable through resident SNMP client facilities (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Standby Batteries.** The UPS shall be provided with a set of standby batteries to provide for a maximum of 20 minute standby time (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Type of Batteries.** Standby batteries shall be non-"lead-acid", maintenance free and immune to memory AH capacity reduction effects (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Charging of Batteries.** Batteries shall be capable of deep discharge/charge cycles (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **19" Rack Mountable.** The UPS's and standby batteries supplied shall be 19" rack mountable. Where it is not possible to supply rack mountable UPS's and batteries, the UPS size and battery shall be such as to be installed loose standing in the bottom of one of the equipment racks supplied (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## VSAT Terminal Indoor Equipment Racks Installation

The new equipment racks for the indoor equipment shall be compliant to and based on the following requirements:

1. **Equipment Rack Size.** The maximum height of a 19" equipment rack used for the installation of indoor equipment shall not exceed 42 U (rack units). 19" inch equipment racks shall be at least 600-mm deep (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Equipment Rack Construction.** The equipment rack shall be of a modular frame construction with two mild steel side panels, rear hinged, but removable, mild steel door and a front hinged, but removable glass door. The colour of the equipment rack shall be goose grey in accordance with BS4800 00A05 (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Equipment Rack Mains Power.** A 2U panel with at least 2 isolating circuit breakers shall be used to distribute/isolate the 220/240 V AC power feed from the UPS to the new 19” equipment rack. The 2U-power panel shall be installed at the front and bottom of the new 19” equipment rack. One isolating circuit breaker shall feed the forced ventilation fan tray. The other isolating circuit breaker shall feed the multiple plug mains distribution panel at the back of the equipment cabinet (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Mains Distribution Panel.** The new equipment rack shall be provided with a mains power distribution panel or strip installed at the rear and side of the equipment rack. The power distribution panel or strip shall provide IEC 320 type socket outlets for distributing mains to the individual indoor equipment sets installed in the equipment rack. Three (3) spare IEC 320 sockets per distribution panel shall be available after the rack has been fully populated (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Ventilation.** A forced ventilation fan tray with at least four (4) ventilation fans shall be provided and installed at the top of each new 19” rack. The fan tray shall be connected to one of the mains feed isolating circuit breakers (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Filter Ventilation Grille.** A filter ventilation grille shall be installed at the bottom of the new equipment rack. The filter ventilation grille shall conform to IEC 297 and be fitted with a washable polyfoam filter (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Vented Trays.** All indoor equipment shall be installed in the new equipment rack on standard fixed vented shelving (M).
2. **Sliding Keyboard Drawers.** Computer keyboardsshall be installedin rack mounted sliding drawer trays (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Cable Tray.** A steel multi-punched cable tray shall be installed at the rear and opposite side of the power distribution panel. The steel cable tray shall be used for distributing low level signal type and equipment interconnecting cables. The cable tray shall run the full length of the equipment rack (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Single Cable Hoops.** Single steel cable hoops shall be installed and fixed to one of the rear new equipment rack modular pillars. The steel cable hoops shall be used to thread/ distribute RF and IF cables to the individual equipment sets (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Equipment Earthing.** It is preferred that all equipment racks and cabinets be connected to the building earth via a separate earthing cable or strap. Care shall be taken that the building earth and the electrical mains earth are at equipotential. This shall be confirmed and measured during the site visit to each site (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Remote Site Installation Procedures

As part of the tender, the tenderer shall submit an installation procedure as part of the ITCP as mentioned in volume 3 of the RFT (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

# installation requirements

## General Installation Requirements

11.1.1 CAFSAT VSAT terminals shall be installed at the main Luanda Air Traffic Control Centre (New). The installation will be preceded with a “Site Survey” as given under paragraph 11.2 of this document (I).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

**11.1.2 Installation Specifications.** The information captured during the site survey shall be revised, reworked and compiled into a VSAT site specific "Installation Specification" (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Installation Specification Approval.** Each VSAT site specific "Installation Specification" shall be approved by the on-site user before commencement of any installation work (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Individual Site Surveys

1. **Site Survey Visits.**  Site survey visits shall be conducted. The Contractor's site survey team shall be accompanied by an engineer from ATNS (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Site Survey Report.** A detailed site survey report shall be drafted from the data collected during the physical site survey and submitted for approval. The detailed specific site installation specifications shall be developed and drafted from the site detail as recorded in the site survey reports (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Site Survey Information.** The site survey information gathered during the physical visit to the site shall include but not be limited to (M):
2. Senior civil aviation personnel contact detail.
3. On-site technical personnel detail
4. Site physical (delivery) and postal addresses.
5. Site geographical measured data.
6. Location of antenna position
7. Status of orbital arc clearance from antenna position
8. Equipment building location
9. Location of equipment rooms
10. Distances of antenna to equipment rooms
11. Distances to MDF racks
12. Distances to electrical distribution boxes
13. New cable trays and ducts required.
14. Status of electrical feed to new cabinet.
15. Neutral-earth, live-earth, neutral-live, status of building earth.
16. Site and equipment building layout diagrams
17. Any other details that the Contractor deem important to fully describe the site where a VSAT terminal will be installed.

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Site Survey Form.** A functional draft site survey form shall be included in the response to Volume 3 (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Contractors Responsibility.** In terms of capturing data during the site surveys, the successful Contractor shall be responsible for the following on-site implementation items. Also refer to paragraph 10.6 “Standard Site Installation”. (M):

12.2.5.1 installation of outdoor and indoor equipment.

12.2.5.2 Positioning of new indoor equipment racks.

12.2.5.3 New indoor cable ducting and cable trays required for the installation.

12.2.5.5 Preparation of cabling for connectivity of installed indoor equipment to user on-site ATS/DS, AFTN and ATN equipment.

12.2.5.6 Installation and connecting of UPS equipment, where required (refer to paragraphs 10.6.3 and 10.11.1 of this document.

12.2.5.7 Connection of the new equipment rack to the user 220/240 VAC mains feed distribution equipment.

12.2.5.8 Commissioning, setting to work of installed equipment, on-site training and transition of operation from existing to installed equipment.

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **On-Site Users Responsibility.** During the site survey the responsibilities of the on-site user shall be established. These responsibilities could typically include the following depending on the site condition and local circumstances (M):
	1. Ensure that the existing antenna has a clear line-of-site to the satellite and remove any obstacles identified during the site survey.
	2. Identification of any new RF interference sources, if any.
	3. Moving of on-site user equipment for positioning of the new VSAT indoor equipment racks.
	4. Removal of cable trays or ducts, if required.
	5. Access to 220/240 VAC distribution equipment.
	6. Equipment room climate control and air conditioning.
	7. Access to user ATS/DS, AFTN and ATN equipment.
	8. User Support and personnel during commissioning, setting to work and on-site training.

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Equipment Distribution and Clearance

As this project is for the installation of existing systems the intention is to investigate various maintenance support options, as part of the existing Logistic Support (LS) System that is in place, for the total support of the project for the economic life of the equipment. The Tenderer shall deliver a draft Integrated Logistic Support Plan as specified under the requirements stipulated in paragraph Volume 4 of this RFT document. The logistic support requirements address the support requirements from contract signature until the end of the "Period of Beneficial Use". Irrespective of the requirements as given under Volume 4 of this RFT, the following information pertaining to the distribution, storage and clearance of equipment during the installation phase shall be provided (M):

1. **PHS+T Requirements.** A detailed "Installation Packaging, Handling, Storage and Transport Plan" (PHS+T) shall be developed and submitted as part of the response to this Volume 2. The plan shall show how the VSAT indoor and outdoor equipment shall be handled; transported to the different countries; stored; customs cleared in Angola; and distributed to site during the installation phases of the project (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **PHS +T Items.** The PHS+T Planshall provide, but not be limited to, detail on the following, subject matters (M):
2. Responsibilities of the different parties.
3. Proforma Invoices.
4. Import Declarations, Applications and Approvals.
5. Pre-shipment clearances, if any.
6. Pre-shipment inspections, if any.
7. Clean Reports, if any.
8. Clear Reports, if any.
9. Import Clearance and Deliveries.
10. Customs Duties and Taxes - including VAT
11. Security and Transport.
12. Security and Storage.
13. Insurances.

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Procedures for Transfer of Operations

12.4.5 **Transition plan and schedule for the transfer of operations.** The Contractor shall compile a draft outline transition plan and schedule as part of the RFT. The final transition plan will be presented by the Contractor for approval by ATNS as part of the Installation, Transition and Commissioning Plan (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

# VSAT terminal maintenance requirements

## General Maintenance Requirements

1. The tender to propose a Logistic Support System to be utilised for the support of the this project, as specified under the requirements stipulated in Volume 4 of this RFT document. (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Irrespective of the requirements as given under Volume 4 of this RFT, the following information pertaining to the maintenance and maintenance management of the CAFSAT VSAT terminal during the installation, commissioning and "setting-to-work" phases shall be provided (M)
2. **Maintenance Responsibility.** From the terminal hand-over up until the end of the "Period of Beneficial Use" the system will be maintained by the Company’s Engineering Technicians as per the ILSP, under the responsibility of the Contractor (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Maintenance Levels.** The network support, maintenance and maintenance management to be conducted shall be optimised through the development and implementation of the logistic support system based on the following industry standard maintenance levels (M):

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

* 1. **O-Level.** Operator level maintenance shall be the responsibility of the "on-site" user personnel and shall only include fault reporting for that particular site. (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

* 1. **I-Level.** End-User shall conduct all Intermediate level maintenance which will include the physical corrective and preventative maintenance site visits, LRU replacement, reconfiguration of the site, reboots, routine maintenance, completion of failure reports, engineering support and the management of the on-site maintenance actions up until the end of the "Period of Beneficial Use" for all network sites (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

* 1. **D-Level (Fault Reporting).** Depot level maintenance, and in particular fault reporting and fault management. (I).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

* 1. **D-Level (Repair and Management).** Depot level maintenance shall be the responsibility of the successful Contractor and shall include all depot level repairs to equipment and LRU's, spares replenishment, equipment distribution and maintenance and support management up until the end of the "Period of Beneficial Use". After the "Period of Beneficial Use", ATNS may decide to sub-contract specific D-level responsibilities to the successful Contractor. "D-Level" maintenance shall be conducted in accordance with the network logistic support system developed, optimised and implemented by the successful tenderer (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Terminal Availability

VSAT terminal availability calculations shall be included based on the following. Please also refer to Volume 4 paragraph 6.5, Reliability, Availability and Maintainability for further information and special requirements.

1. **Terminal Reliability Diagram.** A VSAT terminal reliability block diagram shall be provided for the VSAT site. The reliability block diagram shall at least show all main equipment components as per the offered configurations (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Individual Equipment Failure Rates.** For each of the sites, a table showing equipment/component "Mean Time between Failures (MTBF)", failure rate/hour and reliability/operational hour shall be provided. Tenderers shall show how the MTBF figures have been calculated (theoretical) or measured (practical) (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **VSAT Site Reliability. R**eliability figure shall be calculated and shown (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **VSAT Site Availability.** For the CAFSAT terminal, a typical inherent site availability figure shall be calculated and shown, assuming a typical three (3) hour "Mean Time to Repair (MTTR)" from start of corrective maintenance to end of corrective maintenance, excluding logistic and administrative delay (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## On-Site Maintenance Requirement

The "on-site" maintenance is essentially physical repair activities to ensure the network operability and performance (I).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. The "on-site" personnel using the "on-site" local M&C client terminal will perform "O" and "I"-level maintenance. "On-site" maintenance activities will include, but not be limited to the following (M):
	1. First line maintenance.
	2. Preventative activities and management thereof.
	3. Fault reporting.
	4. Completion of failure reports.
	5. LRU fault diagnosis.
	6. LRU replacement.
	7. Software reboots and software configurations.
	8. Re-alignment.
	9. Routine servicing.
	10. Completion of failure reports.
	11. Failure reports.
	12. Miscellaneous corrective and preventative tasks.
	13. Engineering support.

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Service Provider Maintenance Support

The end user shall assume the maintenance management and support function to the terminal after successful acceptance. This maintenance management and support function shall include but not be limited to:

1. Off-air measurements of carriers and timeslots and data streams of the failed site (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Reconfiguration of terminal parameters that could affect the overall network performance (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Other technical support and co-ordination amongst network users during “difficult-to-clear” failure occurrences (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Configuration and final commissioning of terminals added to the network (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Spares repair and replenishment of failed spares and LRU’s after final VSAT terminal acceptance (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

# training requirements

## Pre-installation Comprehensive Supplier Training

Pre-installation detailed technical training shall be provided to Company Engineering Technicians. The pre-installation training shall consist of in-depth and specific technical, operational and maintenance training pertaining to the VSAT installation. It shall include, but not limited to (please also refer to Volume 4, paragraph 6.5):

1. **Satellite Communications and VSAT Technology Platform.** Satellite communication in general and specific aspects related to the VSAT installation offered, such as bandwidth control, network sizing, traffic sizing, satellite access protocols used, circuit establishment, circuit interfaces (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **VSAT Site Construction and Configuration.** Indoor and outdoor site construction inclusive of outdoor terminal line-up and indoor terminal configurations (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **VSAT Terminal Operation and Maintenance.** All operational and maintenance items as included under the training that will be conducted "on-site" during the installation of the individual remote terminals (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## On-Site Operation and Maintenance Training

"On-site" operation and maintenance training shall be provided to the maintenance personnel at the time of the installation by the Contractor. The individual site-training program shall include but not be limited to:

1. **Basic Knowledge.** Overview and basic operational aspects of the VSAT installation offered. (M)

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Handbooks.** Handling and use of the different operational and maintenance handbooks and manuals (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Basic Installation and Configuration.** The installation, dismantling and configuration of the different equipment sets and LRU’s (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **VSAT Terminal Operation.** Physical operation of the VSAT terminal (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Failure Identification.** The identification and localisation of hardware and software problems and failures at sub-system and LRU level through the use of the local network management terminal (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Maintenance.** Hardware and software maintenance procedures and actions including

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Preventative maintenance (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Transfer of operation to new equipment.** Actions and procedures during transfer of operation to the installed equipment.

# spare parts, tools and test equipment

A complement of recommended spare parts, special tools and test equipment are required for the CAFSAT terminal shall be listed (M)

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Spare Part Calculation

1. **Probability of Failure.** A table shall be included showing the detailed calculation of the "Probability of Failure" for each of the equipment sets/components identified in the VSAT terminal reliability block diagrams. A one year operational time period shall be used for the calculation(M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Summary Spare Part.** The "Probability of Failure" table shall be revised to show the expected annual spares part pool required (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Service Provider Spare Parts and Spares Pool

Spare parts and tools shall be provided based on the following:

1. The "Probability of Failure" annual spares pool per equipment set/component (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. The equipment sets/components spares pool per may be divided into specific Line Replaceable Units (LRU’s) such as, line interface cards, processor boards, power supplies, backplane boards and chassis (D).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Consumables such as fuses, connectors, dust filters, and cables (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Back-up software such as operating systems, configuration routines and maintenance software utilities (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. A table shall be included showing the annual spares required (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

# verification and Qualification REQUIREMENTS

## General Network Verification and Qualification

1. The successful tenderer shall be responsible for all equipment configurations, commissioning and verification of the operational status of the VSAT terminals in accordance with the requirements and standards of the VSAT Technology Supplier and INTELSAT as the Satellite Resource Supplier (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. VSAT site verification and qualification tests conducted shall be in accordance with the approved Test and Evaluation Master Plan as required and stipulated in Volume 3 of this RFT document (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Responsibility for Network and Site Parameter Configuration

1. **Network Configuration Database.** A Microsoft Excel/Access® database shall be developed and delivered that shall be used to store, manage and co-ordinate, and VSAT site parameters (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Database Independency.** The database shall be independent from any operational database that may be provided as part of the VSAT installation Network Management System (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Network Configuration Parameters.** The configuration database shall be based on a user selectable menu structure providing access to configuration parameters that are linked to each other from the highest menu, being the network communications circuit connectivity down to the individual port parameters (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Equipment Configuration Parameters.** The configuration database shall also provide for storing, managing and co-ordinating general equipment set-up parameters as may be required by the individual equipment manufacturers (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Responsibility for INTELSAT Carrier Line-up and Terminal Verification

1. **Co-ordination of Test Parameters.** The successful tenderer shall be responsible to co-ordinate the requirement for terminal verification testing against INTELSAT requirements (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **Verification Testing.** The successful tenderer shall include in the Test and Evaluation Master Plan any tests that may be required by INTELSAT (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. **INTELSAT Test Result Submission.** The successful tenderer shall be responsible for compiling the final Verification Test Report for submission to INTELSAT (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Installation and Site Commissioning Testing

VSAT site shall be tested and commissioned to show conformance to the network design and VSAT installation as offered. Installation and Commissioning tests shall include, but not be limited to:

1. Physical inspection of the indoor and outdoor installations (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Station verification testing and registration as required by the satellite operator (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. Technical and operational network performance testing (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. AFTN/AHMS, ATS/DS, and Remote Control and Monitoring interconnectivity testing from and between a Luanda, Lisbon and Recife (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Site Acceptance Documentation

On completion of the installation and commissioning tests and as part of the hand-over of the sit, a set of site acceptance documentation shall be delivered. This site acceptance documentation shall include, but not be limited to:

1. An Operation and Maintenance handbook of the individual equipment sets (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. A completed and updated site “As Built” document showing final equipment layouts, site layouts, cabling diagrams and equipment configuration parameters (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

1. A Test and Evaluation document showing all the details and results of the acceptance and commissioning tests completed (M).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |

## Responsibility for Individual Station-to-Station Testing

1. **End-to-End User Tests.** ATNS and the "on-site" user shall be responsible for conducting end-to-end user tests.These tests shall be conducted over a 7-14 day period and shall only take place after commissioning (I).

|  |  |
| --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** |  |