

***COMISION NACIONAL  
DE ACTIVIDADES  
ESPACIALES***

**DIRECT CONTRACT  
(Exclusivity) 51/2017**

**High-speed receivers and telemetry units,  
telecommand and ranging for external stations for  
SAOCOM Project**

**Receipt of Bid: Up to: July 6<sup>th</sup> 2017, 11 AM**

**SUPPLY UNIT  
751, Paseo Colon Ave. 3rd floor - Capital Federal  
Ph: 54-11-4331-0074 ext. 5725  
(polivera@conae.gov.ar)**



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## **Direct Contract (Exclusivity) N° 51/2017**

### **Receipt of Bid:**

**Up to: July 6<sup>th</sup> 2017, 11 AM**

This Provisions and Conditions Form is composed of:

1. PARTICULAR PROVISIONS AND CONDITIONS FORM (includes the Technical Specifications of the line to be quoted) .....Page 3
2. ANNEX I – PARTICULAR CLAUSES CONCOMITANTS LOAN CONTRACT No. 1777/OC-AR .....Page 14
3. ANEXO II – PLANILLA DE COTIZACIÓN..... Page 15
4. ANNEX III. TECHNICAL SPECIFICATIONS .....Page 16



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## PARTICULAR PROVISIONS AND CONDITIONS FORM

Name of Contracting Agency	Comisión Nacional de Actividades Espaciales (CONAE), independent agency acting within the scope of the MINISTRY OF SCIENCE, TECHNOLOGY AND PRODUCTIVE INNOVATION
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### SELECTING PROCEDURE

Type: <b>DIRECT CONTRACT BY EXCLUSIVITY</b>	<b>N° 51</b>	<b>Fiscal year: 2017</b>
<b>Class: NO CLASS</b>		
<b>Method: NO METHOD</b>		
<b>File N°: 168/17 BID</b>		
<b>Commercial category: Equipment</b>		
<b>Contract subject: High-speed receivers and telemetry units, telecommand and ranging for external stations for SAOCOM Project</b>		

### SUBMISSION OF BID

<b>Venue/Address</b>	<b>Opening Time and Date</b>
<i>Unidad de Abastecimiento</i> CONAE 751, Paseo Colon Ave. 3rd Floor, C.A.B.A. Ph: 011 4331-0074 <a href="mailto:u_abaste@conae.gov.ar">u_abaste@conae.gov.ar</a>	The bid shall be sent by email or regular mail up to July 6 <sup>th</sup> 2017, 11 AM.  <b>In case of sending the bid by regular mail, the envelope must be identified with the information about the selecting procedure and the name of the bidder.</b>



### TECHNICAL SPECIFICATIONS

Line	QTY	Unit of measurement	Description
1	6	Units	Telemetry, Telecommand and Ranging Unit for SAOCOM Mission Support. Model CRT-Q Including the following items: 1) CORTEX CRT-Q 2) Plastic ruggedized box for transportation. <i>See Technical Annex III</i>
2	6	Units	High Data Rate Receiver for SAOCOM Mission. HDR-4G in Sprint configuration Including the following items: 1) CORTEX HDR-4G 2) 10TB-SSD (RAID 6) for HDR-4G 3) Plastic ruggedized box for transportation. <i>See Technical Annex III</i>

**Additional requirements:**

- Guarantee of the goods: 12 months
- Goods must be new and delivered in the original factory packaging.
- Delivery of the goods:

If the offer is quoted in a nationalized manner, the goods must be delivered in Teófilo Tabanera Space Center, C-45 route, km 7,5, Falda del Cañete, Province of Córdoba.

For bids made EXW, delivery shall be made at factory, delivery of FOB bids shall be made in port or airport of origin and CIF bids shall be delivered in Destination Port or Airport.

### SPECIAL BIDDING TERMS AND CONDITIONS

#### GLOSSARY

CONAE: NATIONAL AGENCY FOR SPATIAL ACTIVITIES. Contracting Agency.

BIDDER: It is the natural or legal person offering the bid in this procurement.

AWARDEE: It is the natural or legal person awardee of the procurement, through administrative act by competent authority.

COCONTRACTING PARTY: It is the natural or legal person that has been notified about the purchase order.

SUPPLY UNIT: It is the CONAE's Supply Unit. Operative Unit of Procurements of said Commission.

#### **SECTION 1 – RULING FRAMEWORK. PRIORITY RULES**

1.1. Every aspect that has not been set forth in this tender form shall be governed by and interpreted in accordance with the rules established by the Loan Agreement N° 1777/OC-AR, the National Administration Contract Regulations (Decree N° 1023/01), the National Administration Contract Regulations (Decree N° 1030/16), and the Provision N° 63-E/2016.



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In case doubts or discrepancies stemmed from the aforesaid provisions, the following set of priority rules should be observed:

- (a) Loan Agreement N° 1777/OC-AR
- (b) Decree N° 1023/2001, and the modifications and complementary.
- (c) The provisions of the regulations approved by Decree No. 1030/16
- (d) Rules established as a result of the aforementioned decree
- (e) The procedure manual of the Procurement Regime of the National Administration issued by the NATIONAL OFFICE OF CONTRACTS or the rules issued by said National Office as the governing body
- (f) The general bidding terms and conditions
- (g) The particular bidding terms and conditions
- (h) The supplier proposal
- (i) Samples
- (j) Tender
- (k) Purchase order.

### **SECTION 2- ABOUT THE BIDDER**

- 2.1. The bidder shall be entitled to trade the goods to be procured, according to the laws in-force of the country where he is residing.
- 2.2. He shall submit true copy of the application form at the tax entity of the country of origin or equivalent proof.
- 2.3. The foreign bidder and awardee shall be excepted form the obligation of registration in the System of supplier's information.

### **SECTION 3- ABOUT THE QUESTIONS**

- 3.1. Questions related to this procurement shall be made through email to: [magarcia@conae.gov.ar](mailto:magarcia@conae.gov.ar)
- 3.2. Questions can be asked up to TWENTY FOUR (24) hours before the fixed date for the receipt of the bid as minimum.
- 3.3. Telephone consulting shall not be accepted, and those made after deadline shall not be answered.
- 3.4. CONAE shall be able to elaborate clarifying communications to the Special Bidding Terms and Conditions, ex officio or as a reply to questions, up to TWO (2) days before the fixed date for the receipt of the bid as minimum, as per the established in the section 50 of the Decree Law N° 1030/16.

### **SECTION 4 - CONTENTS OF THE BID**

- 4.1. The bid shall be composed of a clear technical description of the goods and/or services offered which shall meet the requisites set forth in section 13 of the General Bidding Terms and Conditions.



***If the bidder does not submit the quote in Spanish, CONAE will translate it into Spanish and this new document shall be considered as the official translation of the quote.***

In the event of any differences or disputes concerning the terms and conditions of this Tender or related to the interpretation or the execution of the signed contract, the Spanish version translated by CONAE shall prevail.

4.2. The foreign bidder shall submit the power of attorney of the bid signer, the bylaws of the company and the articles of incorporation duly certified by Notary Public and authorized by the Argentinean Consulate in the country of origin or the corresponding proceeding as per the in force international treaties; among them, the Hague Convention of 1961 about the removal of the requisite about legalization of foreign public documents. The documentation mentioned in this clause shall be demanded only upon the first submission of the bidder on a tender or procurement process initiated by CONAE. Subsequently, it shall only be necessary to attach the corresponding modifications or updates, if any.

4.3. The bidder acting as authorized agent in the country or as distributor of goods to be imported, shall make such condition clear in its bid. People representing the bidder shall submit the documents (minutes of the meetings where the Board of Directors has been appointed, minutes of the Board of Directors with distribution of positions, mandates, powers of attorney) evidencing their faculties to oblige the bidder, celebrate every act and sign the necessary documents even the selection, unless said information is duly updated in the SYSTEM OF INFORMATION ABOUT SUPPLIERS (SIPRO).

Certifications and Legalizations: Every photocopied document shall be certified by Notary Public and where the demanded documentation has been submitted as a simple photocopy, this Commission shall be able to request the original documents for further collation.

#### **SECTION 5 - TERM OF BID VALIDITY**

5.1. Bidder shall maintain the bid, as a minimum, for the term of SIXTY (60) running days as of the date of bid submittal.

5.2. The term of bid validity shall be extended automatically for a period equal to the initial term and so on, with the exception that the bidder expressly states his intention of not renewing the term of the validity with at least TEN (10) running days in advance on the expiration date of each term. In this case, it shall be without execution of the bid bond.

5.3. If the offeror manifests his will not to keep his offer without complying with the deadlines committed in the proposal, it will be equivalent to exclude him from the procedure, executing the guarantee of maintenance of the offer, and notifying the non-compliance to the NATIONAL OFFICE OF CONTRACTS.

#### **SECTION 6 - ALTERNATIVE BID**

6.1 Apart from the base bids, bidders shall be able to submit alternative bids.

*Decree N° 1030/2016. ARTICLE 56.- "...An alternative bid is that which fulfilling all technical specifications of the foreseen benefits in the tender form and particular*



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*conditions, provides different technical solutions thus there may exist different prices for the same product or service... ”.*

6.2 CONAE shall be able to choose any of the two or more submitted bids, since every one of them competes with the ones submitted by the other bidders.

### **SECTION 7 - VARIANT BID**

7.1 Apart from the base bid, bidders shall be able to submit variant bids only where these bidding terms and conditions expressly accept those in the technical specifications.

*Decree N° 1030/2016. ARTICLE 57.- “...A variable bid is that which modifying technical specifications of the foreseen benefits in the tender form and particular conditions, provides a solution with an improvement which could not be possible if it had to be strictly fulfilled... ”.*

7.2 The jurisdiction or contracting entity shall only compare the base bid of the different bidders and shall only consider the variant bid of the bidder holding the most convenient base bid.

### **SECTION 8 - SAMPLES**

Where the submission of samples is required in the technical specifications, the term to accompany those shall be the date and hour fixed for the reception of the bid.

### **SECTION 9 - QUOTE**

The financial bid shall be submitted within the QUOTATION FORM (ANNEX I) that is part of these bidding terms and conditions.

It shall include a real unit price, in numbers, with reference to the measurement unit established in this section.

9.1 The quotes for national products shall be made in PESOS. The value added tax (VAT) shall be included and must detail the percentage of the tax rate applied.

9.2 The quotes for foreign products, nationalized by the bidder, shall be made in PESOS or AMERICAN DOLLARS. The value added tax (VAT) shall be included and must detail the percentage of the tax rate applied.

9.3 The quotes for the products to be imported and which shall be nationalized by the contracting entity, shall be made in the currency of the country of the product, under FOB, EXW or CIF (INCOTERMS UPC-600 of the CCI), indistinctly. For CIF offers, the FOB value, the freight and insurance shall be broken down, in order to be compared with the offers made under FOB condition. For EXW offers, CONAE shall request its freight forwarder a quotation, in order to enable said comparison.

Bidders acting as authorized representatives in the country or the distributors of goods to be imported, shall make such condition clear in their bid and what is set forth in clause 15.3 of this bidding terms and conditions shall apply.

**THE QUOTED PRICE SHALL BE THE FINAL PRICE THAT THE AGENCY SHOULD PAY IN ALL RESPECTS.**

### **SECTION 10 – OFFER VALIDITY WARRANTY**



10.1. The offeror must submit together with his offer a guarantee of maintenance of an offer equivalent to FIVE PERCENT (5%) of the total value of the offer, constituted in one of the forms established in Article 39 of the General Terms and Conditions. In case of being quoted with discounts, alternatives or variants, the guarantee will be calculated on the highest amount proposed.

10.2. It will not be necessary to present a guarantee of maintenance of the offer, in the cases expressly mentioned in article 40 of the General Terms and Conditions.

#### **SECTION 11 - PLACE OF DELIVERY OF GOODS**

11.1. For the bids of national products or nationalized ones by the bidder, delivery must be done in: Teófilo Tabanera Space Center, C-45 route, km 7,5, Falda del Cañete, Province of Córdoba.

11.2. For bids made EXW, delivery shall be made at factory, delivery of FOB bids shall be made in port or airport of origin and CIF bids shall be delivered in Destination Port or Airport.

#### **SECTION 12 - DEADLINE FOR DELIVERY OF GOODS.**

12.1- Bid shall indicate the shortest Delivery Term as possible, expressed in consecutive days. A term no longer than 5 (five) consecutive days, starting from the first consecutive day after receipt of the corresponding Purchase Order, will be considered as Immediate.

12.2- The Delivery Term will start THREE (3) consecutive days after the communication of availability of the Purchase Order or after withdrawing it from the Supply Unit, whichever comes first.

12.3. For acquisitions performed in Ex Works, FOB or CIF condition, the Delivery Term will start from the opening of the corresponding documentary credit or wire transfer reception.

12.4. According to the provisions of article 102, section c), paragraph 1 of the regulations approved by Decree Number 1030/16, the bidder arising as awardee and not fulfilling with stated delivery terms in the bid would be subject to fine of ZERO POINT ZERO FIVE PERCENT (0.05%) of the value that has been met out of term for each working day of delay.

#### **SECTION 13° - REQUISITES FOR GOODS BOUGHT ABROAD BY CONAE**

13.1. Previous to the shipping of goods in their country of origin:

- CONAE must confirm the Commercial Invoice of the items to be shipped: such shall be evaluated according with the pro-form invoice sent.
- Packing list in Spanish or in English, with details of supply, weight and measure of bulks. Brochures and Technical Specifications of the supply shall be required whenever it may be necessary. Likewise, at request of the Customs Agent named by CONAE, all the necessary certificates required by Argentine Customs shall have to be presented under seller's responsibility such as: material, brand, origin, etc.
- Pictures of bulks, pictures of the goods inside the boxes if possible.





- In cases which the Technical Specifications require processes and quality certificates, registry of exemption, as applicable technical condition, its fulfillment shall be necessary and inexcusable condition for shipping and later reception in agreement of the supply.
- In cases indicated by the Technical Specifications: refrigeration at Customs. Chamber temperature, during the whole journey and by any means of transport.
- Load delivery special requisites.
- In case of dangerous load, presentation of DATA SHEET shall be compulsory at the moment of delivery of the goods.
- Special requisites for the handling of goods during delivery and storage.
- In case of failing to duly present the documentation in agreement with CONAE, dispatch shall not be authorised, being the Bidder responsible for any delay or lack of fulfillment in the terms.

13.2. The Supplier should wait for the instructions given by CONAE to proceed to the effective deliver of the supply to the designed forwarder. Delivering the cargo without CONAE authorization will mean a breach of contract and the Supplier should reimburse the damages caused, from the moment of the delivery to the designed agent. In the same way, the Supplier should reimburse CONAE, if the former decides, without counting on the instructions of the Organism, to load the Supply through third party agents, airlines or shipping companies.

13.3. Elements sent to be consumed in Argentine Republic (Definitive Import), and/or elements which should be re-export from this country (Temporary Import), should be pack in separate packages, a Commercial Invoice should be prepared for each type of destination: definitive or temporary, and separate boardings should be made (one for the Definitive Import and other for the Temporary Import).

13.4. The Supplier will pack Goods so that they do not damage in transit to the final destination indicated in the Purchase Order. The packaging should be suitable to resist, with no limitations, rough and careless handling in transit and exposure to extreme temperatures, salt and rains in transit or during storage in open places. The size and weight of the packaging will be taken into account depending on the distance of the final destination of Goods and the lack of loading and unloading heavy equipment in all the stops until the final destination.

The wood destined to the manufacture of boxes or other elements used in the stowage of cargo of International commerce, should be subject to the International Standards for Phytosanitary Measures 15 (ISPMs) established guidelines of the Food and Agriculture Organization of the United Nations.

13.5. CONAE will supervise the fulfillment of the technical specifications for certain packages or means of transport, authorizing or rejecting the delivery in the forwarder assigned for this purpose.

#### **ARTICLE 14° - TERM OF GOODS AND/OR SERVICES FINAL ACCEPTANCE**



14.1. For technical or logistics reasons, CONAE could accept the reception of goods in a term of no more than THIRTY (30) calendar days starting from the first working day following the delivery of the good or service.

14.2. If it is necessary, CONAE will carry out inspections, so as to verify if the specifications agree with those in the contract. The inspections and tests specified in the Technical Specifications, and the place where will they be carried out, will be required by CONAE .

14.3. The inspections and tests could be carried out in the Supplier facilities, where the delivery takes place and/or in the final destination of the Goods and/or Services, in agreement to the Technical Specifications. When they were carried out in the Supplier locations, all the reasonable assistance will be offered free of charge to the representatives of CONAE, even for the plans and data about production.

14.4. In the case of civil works, installation works or any other performance that entails a period of established tests, either by performance of the service, by hidden defects, or any other condition that warrants a time of maturity of the acquired or Contracted, the reception will have conditional nature attentive to the deadlines set for each case in the Specific Terms and Conditions without altering the formation of the guarantee in the terms or forms that are established for each case.

#### **ARTICLE 15 - INVOICING**

15.1. Invoices should be sent once the acceptance of final reception of the goods and/or services subject of the agreement.

Acceptance of final reception will be given within a THIRTY (30) days term starting from the reception of goods or services subject of the agreement, pursuant to article 44 of the Tender Form and General Conditions.

15.2. They should be submitted at Av. Paseo Colón 751, Reception desk, Autonomous City of Buenos Aires, from 10 am to 4 pm. Electronic invoices could be sent at the following e-mail address: [mesadeentradas@conae.gov.ar](mailto:mesadeentradas@conae.gov.ar).

15.3. Suppliers should detail in their invoices: Purchase Order Number, line, item and any other necessary information for the correct identification and individualization of such expenditure.

15.4. Since CONAE is a withholding agent both of the Value Added Tax and of the Income Tax, if awarding companies are excluded from such withholding they should also submit the invoice documents confirming that situation, or on the contrary CONAE will duly perform corresponding withholdings for those concepts.

#### **ARTICLE 16 - PAYMENT FORM AND CURRENCY**

16.1. On the assumption that awarding falls on a bid stated in Argentine PESOS (\$), payment to the awardee will be performed in that currency and through wire transfer within 30 working days from the invoice reception (previous agreement of final acceptance), according to National General Treasury rules.

16.2. If awarding falls on a nationalized bid stated in Foreign Currency, payment to the awardee will be performed in Argentine Pesos and through wire transfer within 30 working days from invoice reception (previous agreement of final acceptance), according



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to National General Treasury rules and the selling exchange rate of BANK OF THE ARGENTINE NATION in force at the moment of the corresponding bank accreditation. BANK ACCOUNT INFORMATION. For the purposes of receiving the payment for the delivered goods and services given they should inform their bank account number in national currency, current or savings account, which should be opened in one of the banks joint to the system, authorized to work as paying agent, named below:

1. BANK OF GALICIA AND BS. AS. Inc.
2. BANK OF ARGENTINE NATION
3. BANK OF BS. AS. PROVINCE
4. BBVA FRANCES BANK Inc.
5. BANK OF BS. AS. CITY
6. PATAGONIA BANK Inc.
7. SAN JUAN BANK Inc.
8. SANTANDER RIO BANK Inc.
9. HSBC ARGENTINA BANK Inc.
10. CREDICOOP LIMITED COOPERATIVE BANK
11. MACRO BANK Inc.
12. CHACO NEW BANK Inc.
13. SANTA FE NEW BANK Inc.
14. SUPERVIELLE BANK Inc.
15. HIPOTECARIO BANK Inc.
16. CITI BANK N.A.
17. SECURITIES BANK Inc.
18. TIERRA DEL FUEGO PROVINCE BANK
19. TUCUMÁN BANK Inc.
20. ENTRE RÍOS NEW BANK Inc.
21. CHUBUT BANK Inc.
22. NEUQUÉN PROVINCE BANK Inc.
23. ITAÚ ARGENTINA BANK Inc.
24. INDUSTRIAL AND COMMERCIAL BANK OF CHINA (ICBC)
25. FORMOSA BANK Inc.
26. CÓRDOBA BANK Inc.

Since Treasury payments are performed through wire transfer informed by the supplier, this requirement should be fulfilled to receive payments as a creditor.

Beneficiary registration. Within the term fixed for that purpose, following forms duly completed should be submitted:

- ANNEX I to Joint Resolution account N° 12/06 of the NATIONAL GENERAL ACCOUNTING AND 5/06 of NATIONAL GENERAL TREASURY – PAYMENTS BENEFICIARIES. REGISTRATION/ MODIFICATION / REACTIVATION APPLICATION – Should be completed and accompanied by Beneficiary CIF record.

- ANNEX to Joint Resolution account N° 37/08 of NATIONAL GENERAL ACCOUNTING and 8/2008 of the NATIONAL GENERAL TREASURY – AUTHORIZATION OF NATIONAL TREASURY TO PERFORM PAYMENTS IN



BANK ACCOUNT - Which should be completed and certified by the authority of the bank where the account is situated.

16.3. For the offers of products to be imported as indicated in section 9.3 of this tender, payment will be performed under some of the foreign circulating documents (irrevocable letter of credit or wire transfer). Payment currency will be the same expressed in the bid.

Letter of credit mentioned in the previous item will be confirmed by some of the Argentine National Bank branches abroad or by some of the banks having commercial relations with that entity.

16.4. CONAE could evaluate other payment proposal offered by the offerors but it is not obliged to accept it.

#### **ARTICLE 17 - ANTI CORRUPTION CLAUSE**

Giving or offering money or any donation will be decisive cause of rejection, without further proceedings of the proposal or bid, in any phase of the proceeding or of the full rights contract cancellation so as to:

- a). Public officers and employees with competence referred to a tender or contract perform or stop doing something related to their functions.
- b). Or so that they take advantage of the influence of their position before other public officer or employee with the described competence, so that they perform or stop doing something related to their functions.
- c). Any person that takes advantage of his relation or influence under some public officer or employee with the described competence, so that they perform or stop doing something related to their functions.

Those who have committed such acts in direct or indirect interest of the contractor, whether as administrator representatives, partners, chief executives, managers, agents, employees, contract workers, business consultants, trustees or any other natural or legal person will be considered perpetrators of this conduct.

These unlawful conducts will have consequences even when they have been executed as an attempt.

#### **ARTICLE 18 - NON DISCLOSURE CLAUSE**

Interested and possible offerors will use technical information included by CONAE in this Tender Form and Particular Conditions and that they eventually have access at the moment of contract execution, to submit their quotation and fulfilling with respective contract obligations, exclusively, and could not be used – such information – with purposes different to those foreseen in the request.

Simply by accessing to technical contents of the request by different formal means legally predisposed, the pure and simple recognition that Argentine Republic National Commission for Space Activities (CONAE) is the exclusive owner of all the applicable and derivative rights of the technical information mentioned is implied.

#### **ARTICLE 19 - COMPETENT JURISDICTION**



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Eventual divergences deriving from this contract will be submitted to Federal Court for Administrative Law Disputes located at Autonomous City of Buenos Aires, waiving to any other jurisdiction that could correspond to them.



**ANNEX I: CONCOMITANT SPECIAL CLAUSES.**

**LOAN CONTRACT No. 1777/OC-AR – SATELLITE AND TERRESTRIAL OBSERVATION BASED APPLICATIONS SYSTEM DEVELOPMENT PROGRAM (PROSAT), CHAPTER IV.**

CLAUSE 4.02. Acquisitions (a) Acquisition of goods, related services and works. The acquisition of goods, services or works enumerated on the list of eligible expenses described on the aforementioned Clause 4.01, shall be conducted in compliance with the laws in force in the Republic of Argentina, provided that it meets the standards of competence, economy, transparency, publicity, equality, efficiency and due process thoroughly described in GN-2278-3, from April 13th 2006 (footnote N°7), which the Executing Entity affirms knowing, and that the following conditions are observed:

- (i) Every works contract shall include a price redetermination methodology; both the price and the methodology should be admissible to the Bank;
- (ii) In order to be able to tender bids or to be awarded a contract, offerors shall not be required to comply with any of the following eligibility conditions: (A) to be registered in Argentina; (B) to have an agent in Argentina; (C) to be a business partner or a subcontractor of an Argentine firm.
- (iii) Invitations to submit offers, bidding documents, tender opening documents, and offer evaluation reports shall be published on a sole, free access website that should be admissible to the Bank;
- (iv) Contracts with foreign contractors and providers shall include the international arbitration procedure as a method to settle controversies that the parties cannot solve by mutual agreement.
- (v) Once the opening of tenders has been publicly conducted, no information on the analysis, clarification and evaluation of bids as well as awarding recommendations should be disclosed to offerors or to parties that are not officially involved in this process until the actual tender has been awarded; and
- (vi) The offeror who submits the lowest bid shall not be required to lower its price as a condition for awarding.



**ANNEX II: QUOTATION FORM**

**Contract type:**

**Proceeding number:**

**Objective:**

**Offeror Name and Surname or Corporate Name:**

Description	Unit Price	Total Price
R 1:		
R 2:		
<b>Total amount</b>		<b>\$ .....</b>

Delivery Term	
Delivery Place	
Payment method	
Bid validity period	
Tasks/ goods warranty	
True copy of the registration form at the tax entity of the country of origin or equivalent certification	

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SIGNATURE AND PRINTED NAME  
(Attorney with sufficient legal capacity)



**TECHNICAL ANNEX III**

**High Data Rate Receiver for SAOCOM Mission.**

<b>ITEM : DEMODULATOR</b>
<b>UNIT – CORTEX 4G SPRINT</b>
The basic building blocks that the unit must have are the following:
1) High Data Rate (HDR) Dual-Channel Demodulator
1) High Data Rate (HDR) Test Modulator
1) Front End Processing Capabilities (FEP) for both demodulation channels
The unit must be able to receive and process the following CONAE missions:
<b>1.1 SAOCOM mission:</b>
1) Two (2) simultaneous downlink channels with the following characteristics each:
<i>Modulation: 4D-8PSK-TCM</i>
<i>Coding: 254/238 Reed-Solomon <math>t=8</math> + TCM convolutional 5/6</i>
<i>Baud rate: 66.65 Mbaud</i>
<i>Useful data rate: 155.52 Mbps</i>
<i>Stuffing sync words: 96h (first block), 69h (fifteen following blocks)</i>
<i>Mission sync. Words: B8h (first block), 47h (fifteen following blocks)</i>
<i>Data randomization: polynomial <math>1+X^{14}+X^{15}</math>, the pseudo-random sequence being initialized with 100101010000000 at each transport frame (16 blocks of 238 bytes)</i>
<i>Matrix interleaving: with a depth of 16 RS coded blocks. A matrix interleaver 16 rows/254 columns is applied to the encoded blocks. Blocks of 254 bytes are written row by row with the first byte in the first cell. When the interleaver is full, it is read column by column (byte by byte) creating so a group of structure interleaved of 254 bytes</i>
1) The unit must be able to receive and process (demodulate, etc.) data transmitted by the 8PSK Transmitter of SAOCOM mission.
<b>1.2 HDR Dual-Channel Demodulator characteristics (per channel)</b>
<b>1.2.1 IF input signal:</b>
<b>1.</b> Connector type: SMA
→ Two inputs per channel: Nominal and Alternative
1) Level: -50 dBm to -10 dBm
1) Impedance: 50 ohm





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1) VSWR: < 1.5
1) Input frequency: 720 MHz ±190 MHz
1) AGC time constant: 1 ms Typical
1) Search range: from ±10 KHz to ±1MHz
<b>1.2.2 Demodulation and Bit Synchronization:</b>
1) Demodulation: BPSK, QPSK, SQPSK, UQPSK, AQPSK, 8PSK
1) Coding:
<i>CCSDS compliant Viterbi</i>
<i>CCSDS compliant TCM for 8PSK (4D-8PSK-TCM CCSDS 2/3, 2.25/3, 2.5/3, 2.75/3)</i>
<ul style="list-style-type: none"><li>• Maximum Bit rate</li></ul>
<i>BPSK: 240 Mbps, or better.</i>
<i>QPSK: 480 Mbps, or better</i>
<i>8PSK: 240 Mbps, or better. Maximum symbol rate 120 Mbaud, or better.</i>
<ul style="list-style-type: none"><li>• Acquisition time: &lt; 250ms</li><li>• Doppler measurement:</li></ul>
<i>Doppler rate: &lt; 10 KHz/s</i>
1) Carrier phase ambiguity resolution:
<i>Automatic PSK Ambiguity Resolution (QPSK, OQPSK, BPSK, AQPSK, UQPSK)</i>
<i>8PSK: ambiguity resolution differential decoding.</i>
1. Base-band matched filter:
<i>Integrate and dump filter.</i>
<b>1.</b> BER degradation (at BER = 10E-6):
<i>QPSK up to 400 Mbit/s: &lt; 0.5 dB</i>
<i>QPSK from 400 Mbit/s to 500 Mbit/s: &lt; 1 dB</i>
<i>8PSK up to 250 Mbit/s: &lt; 0.5 dB</i>
1) Acquisition threshold:
<i>QPSK: <math>E_s/N_0 &lt; 1</math> dB</i>
<i>8PSK: <math>E_b/N_0 &lt; 3.5</math> dB</i>
1) $E_b/N_0$ measurement available at the Graphical User Interface.
1) FI filter selectable between:
<i>Adjacent channel rejection</i>
<i>matched filter</i>



Custom FIR.

### 1.2.3 FILTERS

- DEAF

1) X-DEAF (including XPD measurement)

### 1.2.4 Base Band Interface specifications:

1) Demodulator data and clock output: ECL Differential

- Connector type: SMA or BNC

1) Impedance: 50  $\Omega$

1) Output ECL differential (DATA+, DATA-, CLOCK+, CLOCK-) for raw demodulated data (FEP off) and processed data (i.e. frame synch, decoded, etc.) (FEP on).

→ CLOCK output polarity: normal / inverted (selectable).

1) DATA output polarity: normal / inverted (selectable).

2) Network Socket outputs 2x10GbE (RJ45)(new)

3) Network Socket outputs 2x10GbE (Fiber) ()

### 1.2.5 Variable Coding & Modulation (VCM)

1) DVB-S2

### 1.3 Monitoring:

- BER measurement at GUI

1) BER counter PN code: configurable to at least:  $2^{23} - 1$ ,  $2^{15} - 1$ ,  $2^{11} - 1$ ,  $2^{10} - 1$

1) Real time constellation analysis and spectral analysis.

2) Spectrum display

3) Eb/No measurement

4) Frequency measurement by integrated Phase

5) Bit Rate offset

6) XPD measurement

### 1.4 CCSDS Data processing

7) RAW

8) CCSDS CADU

9) CCSDS VCDU

10) CCSDS CFDP



**1.5 Storage and Real Time TCP-IP**

**output:**

- Internal Storage 10TB – SSD (RAID 6): 10 Tbytes capacity provide a high speed dual channel recording (up to 500Mbps per channel)
- Real Time TCP IP Output:
  - Must work simultaneously when a standard ECL Data + Clock stream is outputted from the demodulator. Must be possible to output on TCP-IP the “raw-data” just out of the demodulator without any frame-sync performed, or CADU data (out of the frame-sync), or VCDU data (CADU after VCDU filtering).
  - Data must be broadcasted in real time up to 560Mbps per Ethernet Gigabit connector

**1.5 Error correction coding:**

CCSDS Viterbi decoder.

CCSDS Trellis Code Modulation decoder.

**1.6 Reference Frequency:**

- External reference input characteristics:

*Connector: SMA*

*Impedance 50  $\Omega$*

*Level: 0.5 to 10 Vpp*

*Frequency: 10 MHz (sinusoidal or square).*

- Characteristics de Reference Internal:

*Frequency: 10MHz*

*Frequency stability: <  $\pm 5$  ppm (<  $\pm 15$  ppm vs temperature variations (10o to 40o C))*

**1.7 Time Code Reference:**

*1 input.*

*Time Code: IRIG-B.*

*Input level: 0.8 a 8Vpp*

*Impedance: 100Kohm*

*Flywheel capability*

*Time tagging accuracy:  $\pm 50$  uS*

**1.8 Factory Pre-Configured missions:**

- The demodulator must be able to receive and support SAOCOM's missions:

All the configuration parameters for these missions shall also be programmable by the user. In addition, must be able to add and configure new missions by the user.



### 1.9 Front End Processing Capabilities

- Must be able to process SAOCOM mission
- Must be present in both demodulation channels.
- Frame synchronizations capabilities.
- Reed-Solomon (254, 238)  $t=8$ .
- Matrix de-interleaving with a depth of 16 RS coded blocks.
- De-scrambling: following the polynomial  $1+X^{14} +X^{15}$ , the pseudo-random sequence being initialized with 1001 0101 0000 0000 at each transport frame (16 blocks of 238 bytes)
- TCP/IP real time data interface (up to 2 x 1Gbps)
- Storage data and delayed transference over TCP/IP (i.e.: ftp)

### 1.10 HDR Modulator characteristics

- Must be able to work with the same missions as the demodulator.
- Modulation: BPSK, QPSK, SQPSK, UQPSK, AQPSK, 8PSK, 16APSK, 32APSK, 64APSK
- Coding:

*CCSDS Viterbi encoding*

*CCSDS Trellis Code Modulation*

*encoding for 8PSK (4D-8PSK-TCM, CCSDS 2/3, 2.25/3, 2.5/3, 2.75/3)*

- Bit rate

*BPSK: 240 Mbps, or better.*

*QPSK: 480 Mbps, or better.*

*8PSK: 240 Mbps, or better. Symbol rate 120 Mbaud, or better.*

- Per factory-pre-configured mission configuration and user programmable configuration.
- Modulation source from internal data: programmable PRBS pattern generator, with at least the sequences  $2^{23}-1$ ,  $2^{15}-1$ ,  $2^{11}-1$ ,  $2^{10}-1$ .
- Modulation data sources from external data: The unit must accept external data and clock input and files on disk.
- Noise generator function capability

*Noise density: -95 dBm/Hz to -130 dBm/Hz with 0.1 db precision .*

*Noise bandwidth: 520 – 920 MHz or higher*

- Doppler simulator.(desirable)
- Signal interfaces:

*IF output frequency: 720 MHz . Two ports.*

*Output level according with the demodulator IF input level range.*

*Data and clock inputs: ECL*



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*diferencial, SMA or BNC connectors.*

- Reed-Solomon encoding, matrix interleaving, scrambling and randomization capabilities according to the FEP technical characteristics. (desiderable)
- Multi-channel modulation 2 IF
- VCM Modulation
- Data Playback

### **1.11 General Characteristics**

### **1.12 Monitor and Control interface**

- Local GUI
- TCP/IP over an Ethernet connection

### **1.13 Software and mission configuration upgrade:**

- Software and mission configuration upgrade must be possible at customer site through standard interface (i.e. serial, TCP/IP, CD, etc.)

### **1.14 Mechanical specifications:**

*Height: 4 rack units maximum (7 inch)*

*Width: 19-inch rack mountable chassis.*

*Depth: 550mm maximum*

### **1.15 Power:**

- Voltage between 90 and 240 V, frequency between 47 and 63 Hz, autoswitch.

### **1.16 Documentation to be provided with the unit:**

- In electronic and hard-copy format:

*Safety and Handling Recommendations*

*Installation Manual*

*User Manual*

*Technical Characteristics*

*Interface Control Document*

*Factory Acceptance Test Procedure*

*Factory Acceptance Test Reports*

### **1.17 Backup and restore:**

- A CD/DVD backup copy must be provided with the unit, to restore the Operative System, installed software,



configurations and default factory settings.
<b>1.18 Compliance to regulations:</b>
<ul style="list-style-type: none"><li>The unit must be CE compliant.</li></ul>
<b>1.19 Warranty &amp; Support:</b>
<ul style="list-style-type: none"><li>Standard Warranty</li></ul>
<b>1.20 Mean Time Between Failures</b>
<ul style="list-style-type: none"><li>The MTBF must be bigger than 5.5 years (48200hs).</li><li></li></ul>
<b>1.21 Plastic ruggedized box for transportation</b>

## Telemetry, Telecommand and Ranging unit for SAOCOM Mission Support.

### 1. General Requirements

1.1. CORTEX Q units must support SAOCOM mission requirements, keeping compatibility with SAC-D mission.

1.1.1. During a pass, one unit will operate in its nominal condition, while the other will act as a backup.

1.1.2. If there are simultaneous passes, each unit will serve one of the spacecrafts under sight.

1.2. Full compatibility with CORTEX XL-2 units acquired for SAC-D and SAOCOM missions, according to the specifications in the document “0005001699 CONAE AIT XL2 Rev1”.

1.3. Doppler and ranging capabilities support.

1.3.1. Ranging tones from 2 Hz up to 500 kHz (up to 300 kHz for code ranging).

1.3.2. ESA standard tones (100 kHz, 20 kHz, 16 kHz, 16.8 kHz, 16.16 kHz, 16.032 kHz, 16.008 kHz)

1.3.3. ESA-like tones (user configurable major tone and minor tones frequency set)

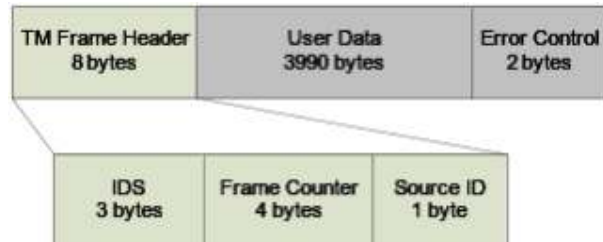
1.3.4. ESA-code (user configurable tone frequency, ESA standard pseudo-random sequences)

1.4. Compliance with CONAE telemetry (TM) and telecommands (TC) frames:

1.4.1. CONAE TM frame specifications:

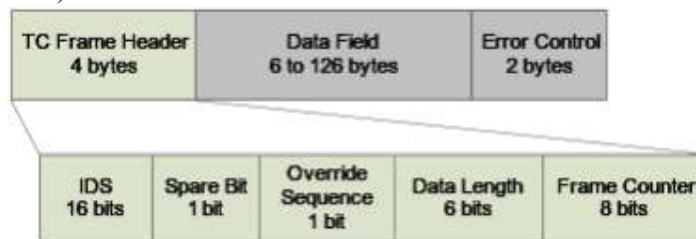


CONAE TM frames are 4000 bytes long, have 3 bytes IDS and 2 bytes CRC (Error Control).



#### 1.4.2. CONAE TC frame specifications:

CONAE TC frames are between 12 and 132 bytes long, have 16 bits IDS and 2 bytes CRC (Error Control).



#### 1.5. TC and TM streams support:

1.5.1. Support to one CONAE frame compliant, low bit-rate (LBR), real-time TC uplink (up to 4 kbps) for both SAC-D and SAOCOM missions.

1.5.2. Support to one CONAE frame compliant, LBR, real-time TM downlink (up to 4 kbps) for both SAC-D and SAOCOM missions.

1.5.3. Support to one CCSDS compliant, high bit-rate (HBR), stored TM downlink (up to 4 Mbps) for SAOCOM mission.

1.5.3.1. Virtual channel (VC) demultiplexing (extraction and processing) is performed through VCID filtering (VCID selection).

1.5.3.2. Stored TM downlink carries a real-time TM VC, which should be able to be extracted (using VCID filtering) right after the frame has been received.

1.5.4. CRC (Error Control field) verification on TM frames (on both LBR and HBR downlinks).

#### 1.6. TM processing capabilities:

1.6.1. TC and TM (LBR and HBR, simultaneously) simultaneous processing.

1.6.2. TM HBR must be able to solve the 8 (eight) OQPSK ambiguities.

1.6.3. The unit must be capable of, simultaneously:

1.6.3.1. Raw (bit synchronized) TM frames storage on the unit's hard disk.



1.6.3.2. TCP/IP output of raw TM frames (LBR and HBR). This feature must be able to be enabled or disabled.

1.6.3.3. TCP/IP output of frame-synchronized TM frames (LBR and HBR).

1.7. IF interfaces support for RF communications with the spacecraft:

1.7.1. 70 MHz IF, PM/BPSK/NRZ-M interface for the LBR TM downlink.

1.7.2. 70 MHz IF, QPSK/NRZ-M interface for the HBR TM downlink.

1.7.3. 70 MHz IF, PM/BPSK/NRZ-M interface for the LBR TC uplink.

1.7.4. 70 MHz IF, PM/BPSK/NRZ-M and QPSK interface for TMS uplink.

1.8. LVTTL interfaces support for base-band communications with the spacecraft:

1.8.1. LVTTL output interfaces (DATA and CLOCK) for CONAE frame-compliant, LBR TM.

1.8.2. LVTTL output interfaces (DATA and CLOCK) for CCSDS-compliant HBR TM.

1.8.3. LVTTL input interfaces (DATA and CLOCK) for CONAE frame-compliant, LBR TC.

1.9. RS-422 interfaces support for base-band communications with the spacecraft:

1.9.1. RS-422 output interfaces (DATA and CLOCK) for CONAE frame-compliant, LBR TM.

1.9.2. RS-422 output interfaces (DATA and CLOCK) for CCSDS-compliant HBR TM.

1.9.3. RS-422 input interfaces (DATA and CLOCK) for CONAE frame-compliant, LBR TC.

## 2. SAOCOM mission requirements

2.1. TM and TC communications requirements:

	Telemetry (TC) IF Downlink		Telecommand (TC) IF Uplink LBR
	LBR	HBR	
Frequency	70 MHz	70 MHz	70 MHz
Bandwidth	300 kHz	≤ 5 MHz	100 kHz
Sub-carrier	80 kHz	-	16 kHz
Data Rate	4 kbps	4 Mbps	4 kbps
Modulation	NRZ-M/BPSK/PM	NRZ-L/QPSK	NRZ-M/BPSK/PM
Encoding	-	Viterbi (R=1/2; K=7)	-
Frame Format	CONAE	CCSDS	CONAE

## 3. Telemetry, Telecommand and Ranging modules requirements

Functiono	Description
Telemetry	One Low Bandwidth Subcarrier chain (TMU-A) : <ul style="list-style-type: none"> <li>BR = 10 bps to 25 kbps, SCF = 40 Hz to 128 kHz</li> </ul>





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Telecommand	<ul style="list-style-type: none"> <li>• PM demodulation at IF</li> <li>• Signal input at IF : IF NOM or IF ALT or AUX (test purpose only)</li> <li>• Signal input at baseband : AUX (IF receiver set to by-pass mode)</li> </ul> <p>One High Bandwidth Subcarrier chain (TMU-C) :</p> <ul style="list-style-type: none"> <li>• BR = 100 bps to 600 kbps, SCF = 5 kHz to 2 MHz</li> <li>• PM demodulation at IF</li> <li>• Signal input at IF : IF NOM or IF ALT or AUX (test purpose only)</li> <li>• Signal input at baseband : AUX (IF receiver set to by-pass mode)</li> <li>• Signal input/output : test set # 3 (RS422) or # 1 (TTL)</li> </ul> <p>One High Bandwidth TM chain direct PCM (TMU-B) :</p> <ul style="list-style-type: none"> <li>• Viterbi &amp; R-S decoding capability</li> <li>• BR = 100 bps to 9.5 Mbps (modulation dependant)</li> <li>• PCM/PM, BPSK, QPSK &amp; OQPSK demodulation at IF</li> <li>• Signal input at IF : IF NOM or IF ALT</li> <li>• Signal input/output : test set # 4 (RS422) or # 2 (TTL).</li> </ul> <p>High Bandwidth TCU :</p> <ul style="list-style-type: none"> <li>• Subcarrier or direct PCM modulation at baseband</li> <li>• BR = 100 bps to 1 Mbps; PSK SCF = 5 kHz to 2 MHz</li> <li>• FM, PM, BPSK, QPSK modulation at IF</li> <li>• Signal input/output at TTL : Test Set # 3 (RS422) or # 1 (TTL)</li> </ul>
Ranging	High bandwidth, up to 500 kHz major tone
TM Simulator	<p>High Bandwidth TMS :</p> <ul style="list-style-type: none"> <li>• Simulation of HBW TM direct PCM or with sub-carrier (down to 5 kHz SCF)</li> <li>• R-S encoding capability (Pseudo and File mode only)</li> <li>• Viterbi encoding capability</li> <li>• Signal input/output at TTL : test set # 4 (RS422) or # 1 (TTL)</li> </ul>
IF Modulator	IFM in Video+PCM mode
Diversity Combiner	Yes, Post Detection
Noise Generator	Available
Warranty	Standard
Power:	Voltage between 90 and 240 V, frequency between 47 and 63 Hz, autoswitch.
Shipment Container	Plastic ruggedized box for transportation
L/S - Band Input and Output for CRT-Q	2 L/S-Bd Inputs & 1 L/S-Bd Outputs Usual 70 Mhz legacy Inputs/Outputs remain available..
Recovery Method	Should include a method to restore the factory configuration and
Mean Time Between Failures	The MTBF must be bigger than 5.5 years (48200hs).